DEPARTMENT OF NURSING
OTTAWA GENERAL HOSPITAL

the

Canadian Nurse

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JANUARY 1963

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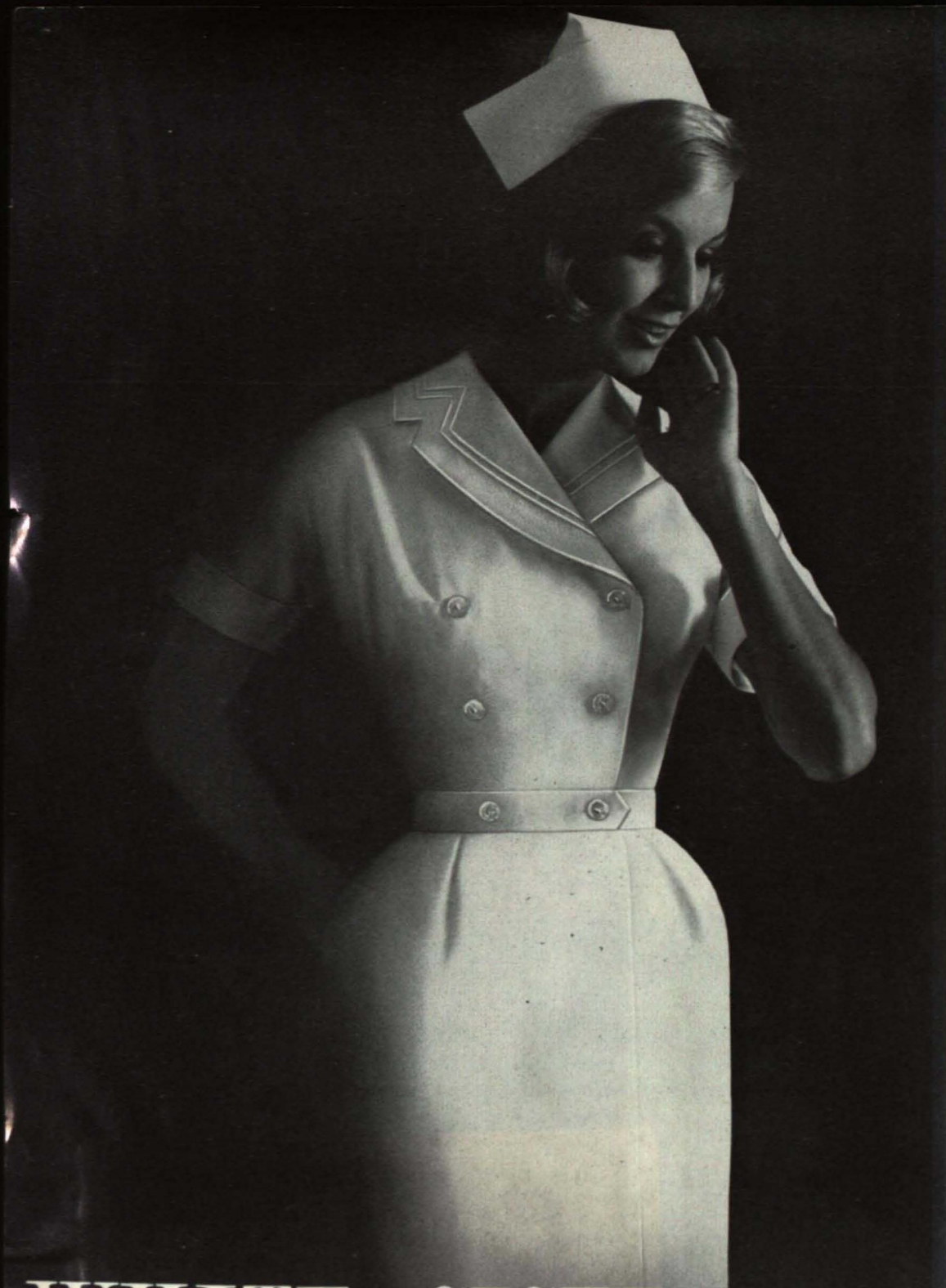

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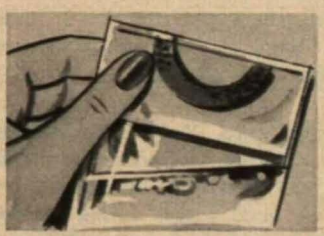

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Three years ago, as the sixth decade of this century started, many pious hopes were expressed that the sixties would go down in history as an era of growth, of expanding well-being all over the world, above all, of peace.

Some of these dreams are being realized. New phraseology is used to refer to those countries that were formerly called "backward," the "have-nots." Today, they are the "emerging" areas. Great strides are being taken by such organizations as World Health to purge the varied environments of indigenous diseases; by F.A.O. to not only distribute surplus foodstuffs but to teach improved agricultural techniques to the native farmers; by U.N.E.S.C.O. to provide educational opportunities that have never before existed. Vast sums of money are being diverted to the mighty task of raising living standards in the emerging countries above the mere pittance that has always been the lot of the ordinary families.

Yet, the most longed-for dream of all — peace, freedom from external pressures, friendship among all nations — seems even more remote today than it did at the beginning of this decade. In so many areas there is increasing conflict, increasing danger of the holocaust that might well plunge the whole world into darkness. To wish our friends a "happy" new year could be considered meaningless or ironical. So we wish you good health and vigor that you may look for and find those opportunities to serve others that are so important to a nurse. May 1963 be reasonably kind to us all!

* * *

For many years, the Government of Canada, through a special division of the Department of National Health and Welfare, has endeavored to spur the provincial and municipal authorities to a sense of awareness of the risks involved in a national disaster even short of actual warfare. Like the proverbial ostrich, many areas have protested "it cannot happen here." Elsewhere in the world today, countries such as India have found that enemy assaults can and do occur.

Five years ago we devoted an entire issue to a series of articles that outlined in clear language the role the medical professions would be expected to play in the event of any attack upon Canada. This month we are again providing background information that will answer the questions of every *surviving* nurse in Canada — "what do I do if?"

In December 1962, the *Canadian Medical Association Journal* utilized one of their issues to inform the doctors of Canada of their enormous responsibilities in emergency care. We are grateful to the *C.M.A.J.* for the opportunity they have afforded us to share all of their material with you. In addition, we present articles relating the nursing aspects of emergency care to the whole picture. SISTER MARY FELICITAS, director of the School of Nursing, St. Mary's Hospital, Montreal, describes the steps that are being taken all over Canada to broaden the understanding of student nurses respecting the important role they may have to play. Mrs. HELEN GEMEROY, of Allan Memorial Institute, Montreal, confirms the functions of those stalwarts of the community, the public health nurses. Miss EVELYN PEPPER who has worked harder and longer than any other nurse in Canada to arouse our profession to an understanding of our responsibilities, considers the importance of the family unit when calamity strikes.

You cannot possibly absorb all of the information the articles in this issue seek to impart at one reading. Keep this number in a place where you can find it instantly if, God forbid, Canada should ever move into the front line of attack.

* * *

A closing word. Your editor wishes to express her sincere appreciation to the many chapters and individual nurses who sent such cheery good wishes during her period of hospitalization last autumn. The year 1963 looks very bright health-wise. Thank you all.

Culture being a pursuit of our total perfection by means of getting to know, on all the matters which most concern us, the best which has been thought and said in the world. — MATTHEW ARNOLD

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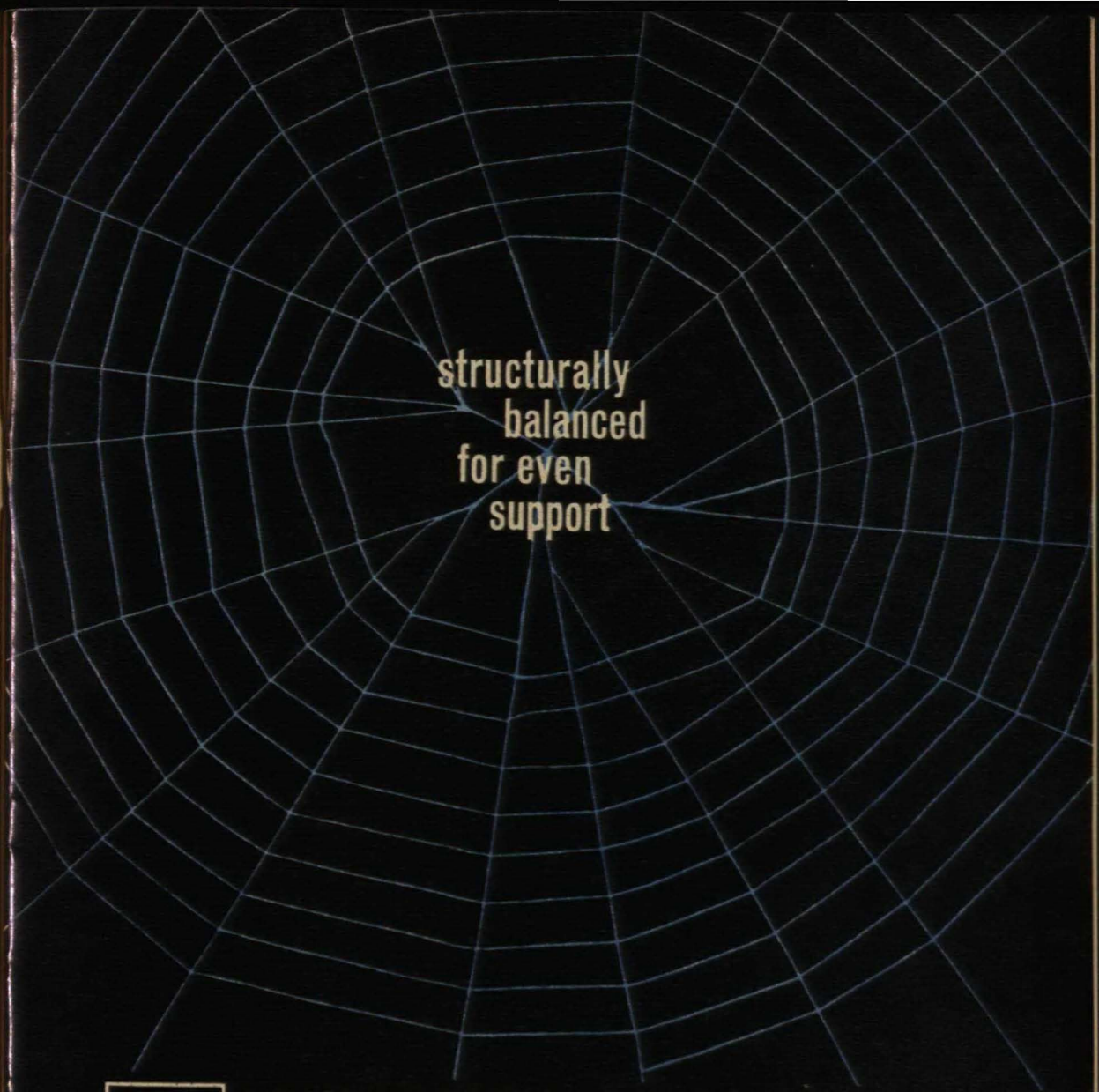

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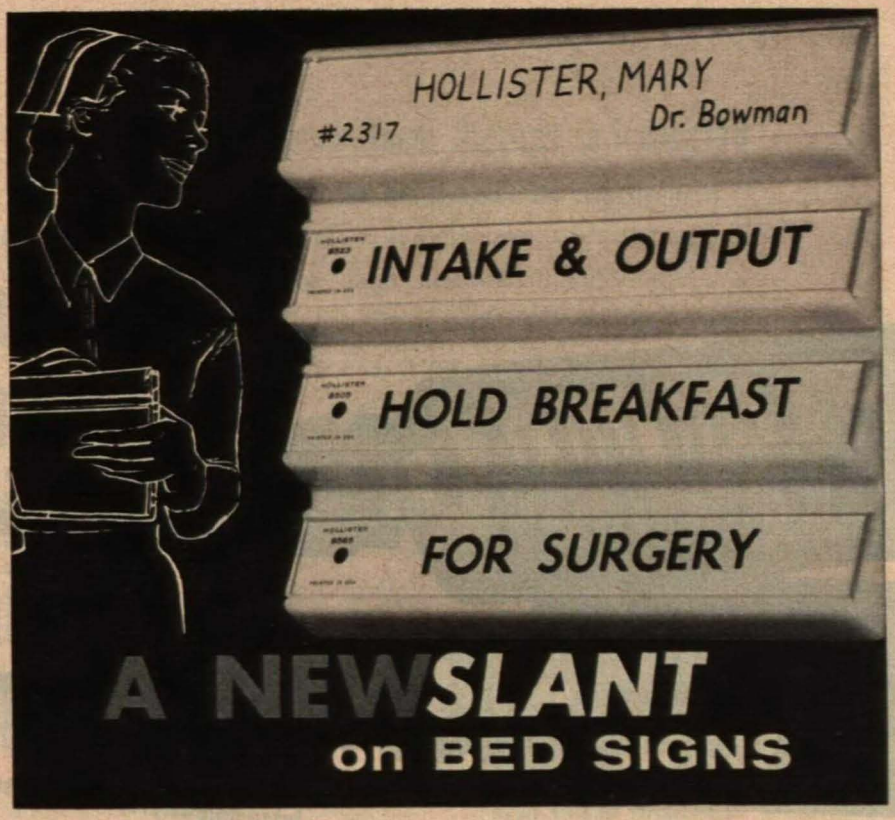

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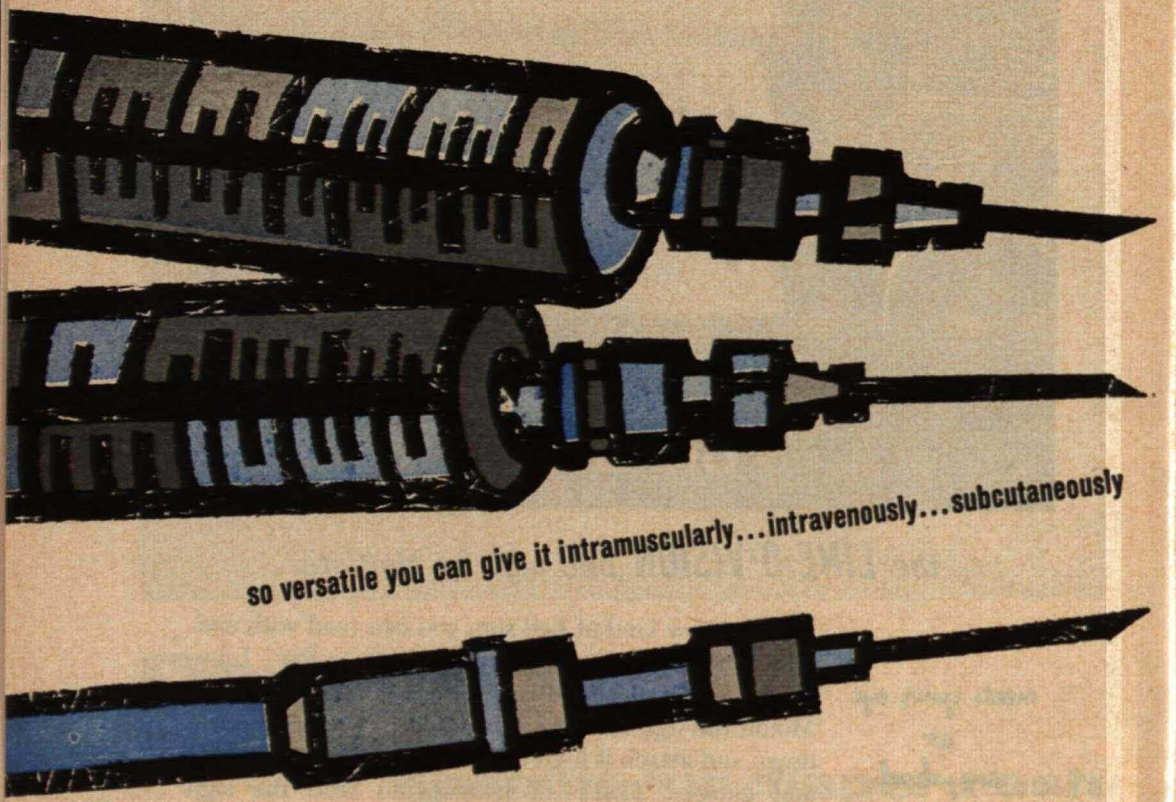

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References: (1) Ross, S.; Puig, J. R., & Zaremba, E. A.: **Antibiotics Annual** 5:803, 1958. (2) McCrumb, F. R., Jr.; Snyder, M. J., & Hicken, W. J.: **Ibid.**, p. 837. (3) Payne, H. M., & Hackney, R. L., Jr.: **Ibid.**, p. 821.

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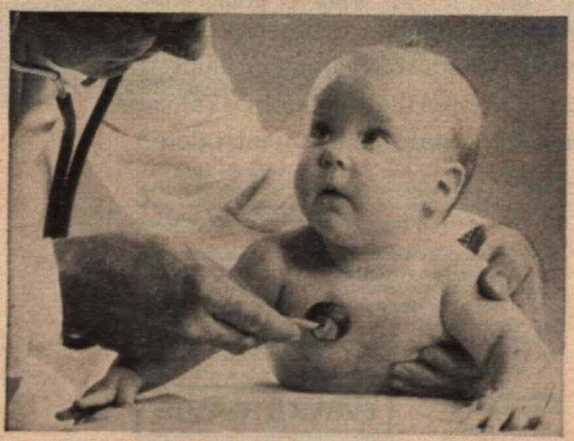

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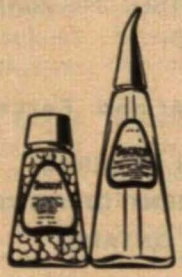

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BY THE CANADIAN NURSES' ASSOCIATION

VOLUME 59 MONTREAL, JANUARY 1963 NUMBER 1

FOREWORD

Canadian newspapers record, as an almost daily occurrence, the stark toll of dead and injured resulting from a disaster situation somewhere in Canada. Halifax, Montreal, Toronto, Windsor, Sarnia, Winnipeg, Vancouver and many other towns and cities have already suffered major catastrophes. In this nuclear age, Canadians everywhere must face up to the possibility of nuclear warfare.

Since the time, location, or extent of disaster can never be predicted, the question we must ask ourselves now is "How well prepared are we to meet and limit the consequences of a disaster?" In assessing preparedness we must recognize that, in the totality of nuclear war, the health professions must be capable of providing life-saving care for the large numbers of injured. At the same time, health workers must be prepared to institute measures for the maintenance of health and prevention of disease in the surviving population. The obvious discrepancy between the predicted workload and the number of physicians and nurses that would be available, indicates clearly what planning must be carried out now, by individuals as well as governments, for the most efficient mobilization and use of the total health resources of our nation.

The Canadian Nurses' Association continues its valuable contribution to

national service by the publication of a second special issue of *The Canadian Nurse*. The previous issue on this topic was published in May, 1957. While many of the professional aspects of the original symposium are still valid, there have been many changes in recent years to strengthen the planning, organization, and administration of Emergency Health Services. This issue is designed to provide to the nursing profession of Canada the additional information that would be required to prepare for a national emergency.

Nurses have traditionally provided leadership in tackling the health problems of our environment. I am confident that they will now respond equally well to the problem of preparing for survival.

THE HONORABLE
J. WALDO MONTEITH,
P.C., M.P., F.C.A., LL.D.,
Minister of National Health
and Welfare.

Emergency Health Planning

A. C. HARDMAN, C.D., M.D.

Each level of government has certain responsibilities to assume in emergency health planning. The effectiveness of this planning will be realized only if members of the health professions accept their individual, family and community responsibilities to prepare for a national emergency.

Development of Emergency Health Services

In 1951, the responsibility for civil defence was transferred from the Department of National Defence to the Department of National Health and Welfare. Following this, a civil defence health planning group was formed. This group studied the health problems associated with the major threat of that time, namely the relatively small atomic bomb delivered by manned aircraft.

The development of the large thermonuclear weapon in 1954, and new delivery systems, caused a major revision of Civil Defence Health Services' policies and programs. This was followed in 1959 by a major reorganization of civil defence in which the Civil Defence Health Services became the Emergency Health Services Division of the Health Directorate of the Department of National Health and Welfare.

Responsibility for Emergency Health Services

In 1958, the Canadian Government surveyed the civil defence situation across the country. This survey was analyzed in the context of the total military and civilian arrangements necessary to prepare the country for the possibility of nuclear war. The Government decided to reorganize civil defence following two major principles :

1. Civil defence should be considered as a normal function or activity of government rather than a specialized organization.

2. Civil defence functions should be divided into clearly defined tasks and assign-

ed to appropriate departments at the various levels of government.

In 1959, two federal/provincial conferences were held to discuss the responsibilities of the various levels of government. Among other emergency responsibilities that were considered to belong to the provincial authorities were :

The organization and control of medical services, hospitals and public health measures;

organization of municipal and other services for the maintenance of water and sewage systems;

training of civilians;

reception services including arrangements for providing accommodation, emergency feeding;

welfare services for people who have lost or left their homes or who require assistance because of the break-down of normal facilities.

In the Civil Defence Order-in-Council issued in September 1959, the Minister of National Health and Welfare was charged with

the provision of advice and assistance to provincial and municipal governments and to others in connection with the organization, preparation and operation of medical, nursing, hospital and public health services.

The role of the Canadian Forces Medical Services in survival operations is related to the role of the Department of National Defence. Since the Canadian Army is responsible for the re-entry operation into disaster areas, the Surgeon General agreed that the Canadian Forces Medical Service should assist in the provision of early treatment to the injured. Close liaison is essential between the Canadian Forces Medical Service and the civilian emergency health authorities at all levels of government. This avoids duplication of effort and ensures the smooth transfer of casualties from the scene of the disaster to civilian medical facilities.

Municipalities are delegated responsibility by the provincial authorities for the organization and control of municipal health services within the framework of the provincial plan. Technical and financial assistance is provided by the provincial and federal governments.

The Planning Organization

The Minister of National Health and Welfare, recognizing that his responsibilities for emergency health planning were too great to be assumed by the existing staff of his department, organized the Emergency Health Services Division as the Health Branch planning agency. In addition, this division is responsible for providing advice on emergency health matters to other governmental planning agencies. Emergency Health Services Division consists of 15 officers and some 60 staff on full time employment. In addition, in each province the Department has appointed a federal employee as the Regional Emergency Health Services Officer. The services of these officers are available on part-time basis.

The Minister of National Health and Welfare formed an Emergency Health Services Advisory Committee in 1961. This committee consists of representatives of the national associations of the various health professions together with representatives of the Surgeon General, Canadian Forces Medical Service, and the Director General, Dental Services.

In November 1959, Federal Emergency Health Services arranged a national conference on emergency health planning. At this time, the Federal authorities recommended the establishment of a suitable planning staff by the provincial governments. Since then, eight of the provinces have organized full-time planning staffs and the remaining two provinces have designated officers on a part-time basis. Most of the provinces have established an Emergency Health Services Advisory Committee including representatives of the various provincial colleges, societies or associations.

The effect of this major achievement at the provincial level is reflected in the marked increase in the demands for advice and assistance from the municipalities. At least two major cities now have designated full-time planning staffs and many communities have assigned the responsibility for this function to the municipal medical officer of health.

Emergency Health Services Programs

The activities of the Emergency

Health Services planning staff at the various levels of government can be broadly grouped into four major programs:

1. *Continuity of Government:* Individual members of each family unit are responsible for taking the necessary steps to ensure their personal survival during the immediate post-attack period. If we are to continue to survive as an organized society, we must ensure the continuity of governmental authority to provide for such things as equitable distribution of food stores, continuing health services, restoration of communications and transportation. We must provide for the continuance of leadership and guidance to the people.

The program is carried out by all essential departments of government. Alternate sites have been selected and are being prepared for use in an emergency. Essential records and documents have been duplicated and legislation prepared. The staff members for each site have been designated and are presently being trained for their emergency role.

At the national level there is a centre for government designated as the *National Site*. Here government leaders will meet to carry out their emergency functions and prepare policy decisions. This site is not large enough for the operation of essential government departments. Departmental relocation sites are being set up throughout the Ottawa Valley where selected departmental officers will carry out their operational responsibilities.

At the provincial level, regional headquarters are under construction. These headquarters will house key officials of the provincial health agencies together with the Federal Emergency Health Services Officers and the military medical representatives. The provincial department of health must also establish a relocation site from which the operations of the provincial health services will be directed.

It would be extremely difficult to direct all the municipal civil defence organizations from one regional headquarters. Most provinces have established zone headquarters to provide an intermediate level of command and control. These headquarters require a medical staff to direct the provincial emergency health services.

In most municipalities, governmental functions would be carried out in the normal location. However, in 16 potential target cities, alternate sites of municipal government are being prepared. To support reentry operations in these areas, the Canadian Army has prepared 16 target headquarters. Municipal and provincial emergency health representatives are being assigned to these headquarters.

This program has been designed to ensure continuity of government at the federal, provincial and municipal levels. Emergency Health Services staff must be prepared to ensure the maximum use of our surviving health resources in the post-attack period.

2. *Organization Programs:* The previous program will be of very little use, unless health services are organized at the community level. In this organizational program we have followed certain basic principles:

a. Existing health agencies and organizations are the basic structure for an emergency service.

b. In a community, the two types of organizations suitable for emergencies, are the hospitals and the departments of health.

The first project in this program was the stimulation of hospitals to carry out disaster planning. Approximately 50 per cent of hospitals to date have developed reasonable plans. Emphasis on this phase is continuing.

The second phase of the program entails the action of municipal health authorities in preparing a community disaster plan. Such a plan must provide for the coordination of hospital plans for casualty care as well as the preventive health measures to be instituted by the deparments of health. Community planning provides the method of affiliation of health workers to a specific organization within which they perform their emergency function.

3. *Information and Education Programs:* These are directed to the general public and are designed to make the family unit self-sufficient for the first seven to fourteen days of a national emergency. Information on measures to deal with likely health hazards is provided through brochures, pamphlets, displays and other media of communication. We place great emphasis on a comprehensive first aid and home nursing program. In the past five years, approximately 500,000 lay persons have been prepared under the auspices of the St. John Ambulance Association. Negotiations are under way to have such training incorporated in the curricula of high schools.

Information and education programs directed at the health worker have been developed in two distinct areas. It is un-

reasonable to expect any individual to perform an emergency function if his family is in danger. Consequently, with the cooperation of the various national and provincial associations of the health professions, information on family survival planning has been made available to their members.

The second area involves the training of workers in the professional aspects of their emergency functions. This program is conducted at both the undergraduate and postgraduate level. Six of twelve medical schools presently teach some aspects of emergency medical care. Measures are underway to expand this project. All schools of nursing presently include emergency nursing care as part of the basic curriculum. We hope to improve and standardize this teaching. Suitable training is presently being incorporated in curricula for sanitary inspectors and other health workers.

The major problems rests in the field of postgraduate education. The bulk of this preparation to date has been carried out centrally at the Civil Defence College. During the past year, provincial health authorities have expanded this program by means of courses, seminars and institutes conducted within the provinces.

4. *National Health Stockpile Program:* The first three programs are directed to the organization and training of an Emergency Health Services division. The fourth program provides the essential supplies.

The Federal Government has authorized the establishment of a national stockpile of health supplies and equipment amounting to $18,000,000. To date, Emergency Health Services has received stores to the value of $12,000,000. These have been packaged and distributed to regional depots across the country. Orders have been placed for an additional four million dollars. The stockpile contains both packaged units and bulk resupply items designed to provide medical care for 200,000 casualties.

Maintenance of these stocks in regional depots does not ensure their ready availability in time of emergency. Agreement has been reached with seven of the provinces for the release of disaster kits to hospitals that possess an approved disaster plan. Negotiations are underway for the release of other packaged units as the emergency organizations are developed.

Conclusion

The development of emergency health planning has been discussed with an outline of the responsibilities of government. Emergency planning by federal and provincial health agencies is futile unless the individual members of the health professions are ready to undertake their individual, family and community responsibilities to prepare for a national emergency.

IN THE GOOD OLD DAYS

(The Canadian Nurse — JANUARY 1923)

DISMISSAL OF ENTIRE STAFF

Twelve cats employed at Hampstead Poor Law Hospital to deal with a swarm of mice are reported to have fraternized with the enemy. They have been dismissed *en bloc.* We wonder if the grievance was night duty!

* * *

The centralization of schools is not a new idea in the field of general education, although it has only recently been advocated as a means of solving some of the teaching problems in our schools of nursing.

The small school is especially benefited by this plan. It is very seldom that we find a well qualified nurse instructor in charge of the class work in the small school. There are not enough trained instructors to go around, and naturally the nurse who has prepared herself for this type of work chooses to go to the larger school. In addition the small hospital does not feel able to pay the salary.

We all believe that schools of nursing should be financed, in part at least, by the state. We might note in passing that one central school, where all the pupil nurses of the community receive their class instruction, will attract the attention of the public and will be much more likely to win a state appropriation than would small schools.

Emergency Health Services Advisory Committee

G. D. W. CAMERON, M.D., D.P.H.

During recent years, the potential destructiveness of nuclear warfare has changed in both scope and nature. The weapons and delivery systems available today leave no doubt that, if global war occurred, the very existence of Canada as an organized society would be seriously threatened.

Failure to recognize the need to prepare for a national emergency or, worse yet, failure to take necessary action before the event, would lead to a total breakdown of the many services provided by medicine, industry, agriculture, government and other agencies on which we all depend for our day-to-day existence.

No longer can the country depend on the work of a few civil defence specialists to ensure its survival. Federal, provincial and municipal governments are recognizing that emergency planning is a continuing peacetime responsibility. They are assigning specific roles in such planning to their existing departments and agencies, as part of their normal function.

Studies of the relatively small disasters that have occurred in Canada reveal that the health professions are not particularly well organized or equipped to handle emergencies. An examination of the possible effects of a nuclear war makes it obvious that we have a great deal of work to do now to avoid the possibility of a medical catastrophe. We must be prepared to provide lifesaving casualty care and public health services to the maximum number of our people who survive the initial impact.

During World War II, 40 per cent of all our nurses and doctors were in the Armed Forces, together with members of the other health professions and technologies necessary to the efficient functioning of the medical profession. Now, however, if this continent were to be subject to attack, we would all, in a period of hours, be faced with a major discrepancy between the medical workload and the surviving medical resources. There would be no time available to mobilize health workers and shape them into an organization capable of collective action. We must plan now to use every available trained health worker as part of the medical team and to increase the knowledge of the public in first aid, home nursing and general sanitary procedures.

This is a major undertaking involving all levels of government, the health professions and many other agencies.

Naturally, the federal government looked to the national associations of the principal health professions for advice and assistance in the organization and conduct of the various programs designed to increase the medical preparedness of the country. In December 1960 the Cabinet authorized the creation of a committee to provide advice and assistance on emergency health planning to the Minister of National Health and Welfare.

The major problem facing the Emergency Health Services Advisory Committee is the development of a program for the efficient use of available health manpower. This problem is not unique to nuclear warfare. In 1940 the Committee on Wartime Expenditures established a sub-committee to explore the whole question of medical and hospital services to ensure that there was close cooperation and coordination between the three defence services and the Treatment Branch of the Department of National Health. The sub-committee met on frequent occasions to discuss subjects of mutual interest but the members rapidly realized that their activities did not include matters pertinent to civilian medicine with its many ramifications. With the expansion of the war effort, it was imperative that a coordinating body should be formed to adjudicate the availability of physicians and surgeons with the requirements and demands of civilian and military medical services.

In 1942, the Canadian Medical Procurement and Assignment Board was established. In November 1942, the scope of the Board was extended to include dentists and medical and dental technical personnel. The following month, the field was further widened to include the nursing profession. In October 1944 the duties of the Board were revised to include a review of postgraduate and refresher training facilities in Canada. This was designed to meet the needs of medical officers returning to civilian life and to examine the placement opportunities for medical practitioners. To assist the central board in the performance of its duties, divisional advisory committees were established in each province with representatives from the provincial health associations and the provincial licensing bodies. When the Board met for the last time in 1946, it recommended that plans should be developed on a continuing basis for mobilization of medical manpower in any emergency.

In 1949, as a result of the increasing international tension, the Defence Medical and Dental Services Advisory Board was formed to advise the Minister of National Defence and the Minister of National Health and Welfare on all phases of medical preparedness. On reviewing the minutes of the various working parties that were established, it is apparent that a great deal of hard work was carried out. As examples, I need only mention the work accomplished in the fields of medical manpower policies and organizational advice. With the changing conditions of warfare, less emphasis was placed on the mobilization of military forces and the requirement of the Minister of National Defence for the services of the Board decreased. Simultaneously, with the increased threat to the civilian population, new problems appeared. In 1960, the Defence Medical and Dental Services Advisory Board was dissolved to clear the way for the Emergency Health Services Advisory Committee.

The experience of both previous Boards was used in determining the composition and role of the EHS Advisory Committee. A permanent executive was formed by officers of the Department of National Health and Welfare. Representatives of other interested federal departments were appointed. The national associations of the various health professions were asked to provide representatives as members of the committee. The following associations, agencies and departments participate :

Canadian Medical Association

La Société des Médecins de langue française du Canada

The Canadian Nurses' Association

Canadian Dental Association

Canadian Veterinary Medical Association

Canadian Pharmaceutical Association

Canadian Hospital Association

Representatives of Provincial licensing body

Canadian Forces Medical Service

Royal Canadian Dental Corps

Defence Research Board
Department of Veterans Affairs
Department of Labor

The members of the committee have provided a great deal of useful advice and assistance. This special issue of *The Canadian Nurse* is a concrete example of the support that has been provided in the field of professional education by the associations.

In several of the provinces, the provincial departments of health have formed similar advisory committees, with representatives of the various provincial associations or branches, to further their programs in emergency health planning. Such committees are essential to ensure that emergency plans developed by governmental agencies are acceptable to the professions generally and to ensure that information on such planning reaches the individual practitioner.

THE ARMY IN NATIONAL SURVIVAL

ARTHUR E. WRINCH, C.B.E., C.D.

Effective planning on a national and municipal level is essential if the country is to survive a nuclear war.

Introduction

The survival of a nation, as opposed to the survival of individuals, must involve many matters other than those having to do only with the immediate post-attack situation. There must, for instance, be arrangements under which we may ensure the continued existence of government at all levels. There must be plans for the immediate relief of those in stricken areas as well as plans to ensure the resuscitation and the recovery of the country as a whole. It must be possible to reconstitute the armed forces because they probably will be needed for the continued prosecution of the war very shortly after the initial nuclear attack. In considering the role of the army the broader responsibilities must be borne in mind.

In 1960, the Minister of National Defence stated that: "If a nuclear attack took place, national survival would become the primary task of all defence forces." Thus all three services, navy, army and air force, both regular and reserve components, would be involved in survival operations. The over-all responsibility for planning survival operations and for controlling them is allotted to the Chief of the General Staff who is the head of the army. The army is the primary service in National Defence in respect to all survival matters, with the navy, air force and the Defence Research Board

supporting and assisting to the greatest extent possible consistent with their other duties in active defence.

Privy Council Order 1959/656, known as the Civil Defence Order, became effective September 1, 1959. It allotted responsibilities to four ministers of the Crown: the Prime Minister, the Minister of National Health and Welfare, the Minister of Justice, and the Minister of National Defence. This article will be confined to those responsibilities allotted to the Minister of National Defence.

1. Provision of technical facilities and operation of a system to give warning to the public of the likelihood and imminence of an attack.

2. Determining the location of a nuclear explosion and the patterns of fallout, and giving the necessary warning of fallout to the public.

3. Assessment of damage and casualties from attack and fallout.

4. Controlling, directing and carrying out re-entry, decontamination work, and the rescue and provision of first aid to those trapped or injured, in areas damaged by a nuclear explosion or contaminated by serious radioactive fallout.

5. Direction of police and fire services in seriously damaged or contaminated areas that are the object of re-entry operations.

6. Direction of municipal and other services for the maintenance and repair of water and sewer systems in seriously damaged or contaminated areas.

7. Provision of emergency support to provincial and municipal authorities in the maintenance of law and order and in dealing with panic or the breakdown of civilian authority.

8. Maintenance and operation of emergency communication facilities.

Many responsibilities continue to lie with provinces and municipalities and, in many cases, the role of federal departments is to assist the provinces. In the case of the Department of National Defence, assistance to the provinces involves maintenance of law and order only. The other seven tasks listed above have been allotted specifically to the Department of National Defence.

Assumptions

Work in survival must have a basis on which plans may be made. This is provided by a number of assumptions:

In respect to the anticipated period of warning:

a. We cannot rely on definite strategical warning, or warning of a day or more.

b. We believe the present primary threat to be that of attack by manned bombers armed with nuclear weapons. Such attacks would probably allow us up to three hours tactical warning.

c. We believe that the primary threat will change shortly to a missile attack, still with nuclear warheads. The probable tactical warning that we may receive at that time will be reduced to some 15 minutes, or possibly less.

d. We assume that 5 megaton (MT) weapons, either air-or surface-burst, will be used.

We have assumed that 16 of our major cities must be considered possible targets. Of these, the nine most likely are: Edmonton, Halifax, Hamilton, Montreal, Ottawa, Toronto, Vancouver, Windsor and Winnipeg. The remaining seven, considered less likely, are Calgary, London, Niagara Falls, Quebec, Saint John, N.B., St. John's, Nfld. and Victoria. We assume that a few random bombs might detonate on or over Canadian territory. This would be most likely in the southern parts of Canada with possibly the greatest density in eastern Ontario and western Quebec.

We believe that the implementation of present plans for the maintenance of control in the country by the civil government will ensure the ability of civil government to maintain control.

We assume that in the first few days following an attack the general public will be dazed and in a state of shock; that it will react favorably to leadership. We believe, further, that if serious shortages of food, clothing, gasoline, and other essential commodities should develop later, there might be need for the military to assist civil authority in the maintenance of law and order. We believe, however, that such a period would be unlikely to coincide with the initial rescue phase.

We assume that if all of the target cities were struck in an attack over one million people would need to be rescued.

Principles of Survival Operations

A study of the tasks assigned to na-

tional defence and of the basic assumptions discussed previously has made it possible to evolve certain principles with which it was felt that all plans should comply.

1. Speed in executing rescue operations is of paramount importance to the saving of life.

2. All forces not committed to active operations against enemy forces must be available for survival operations.

3. Maximum manpower must be brought to bear on rescue operations in time to be effective.

4. Survival plans must be flexible to take account of various wind and weather conditions and attack patterns.

5. Survival plans must be simple and must have been rehearsed so that effective operations may start on minimum orders, or even in the absence of orders.

6. Equipment and commodities essential to survival operations must be located outside of probable target areas. Despite the vulnerability of units located inside target areas, plans must aim at their maximum use and must provide for their rapid outward movement to assembly areas.

7. Basic information needed to carry out re-entry operations must be collected beforehand, and must be kept up-to-date.

8. Authority must be decentralized so that local commanders have the necessary powers to execute their assigned responsibilities in case of interrupted communication with higher headquarters.

9. Forces engaged in survival operations should be self-sufficient in essential commodities for the period of such operations. National reserves of equipment needed for survival operations must be decentralized because of expected transportation difficulties.

10. Forces engaged in survival operations may have to be relieved at an early stage in order to participate in active operations against the enemy or to conduct survival operations elsewhere in Canada.

11. Efforts will be directed towards ensuring that maximum warning of the likelihood of an attack is provided to elements of government and the civilian population. Similarly, dissemination of the *take cover and fallout* warnings must be provided for on the highest possible priority.

The Warning System

This has been designed on the basis that it will be useful only if its speed of operation can be adjusted to cope with weapons of the future. The importance of a warning system plus constant access to all relevant intelligence and tactical information cannot be stressed too strongly. In the air defence of North America, warning from the Ballistic Missile Early Warning System (BMEWS) is sent directly to Headquarters North American Air Defence Command (HQ NORAD) at Colorado Springs. Warnings from the Distant Early Warning (DEW) Line, and the Mid-Canada and Pinetree Lines go directly to NORAD Regions and, in some cases, directly to HQ NORAD also. HQ NORAD is the only source of complete and up-to-date early warning information, while air defence regional combat centres are the sources of localized, up-to-date, tactical information once the attacking aircraft come within range of the Pinetree radar chain.

To alert the public, and to direct the people to listen to their local radio stations for instructions, sirens are needed. Their provision, maintenance and control are army responsibilities. Similarly, the provision of communication links to broadcast stations allocated a civil defence role rests with the army.

We must have a warning system to gather information and present it for assessment so that a decision may be made on the necessity to alert the public. Once the decision has been made, the system carries the warnings, "alert" and "take cover," to the public. Canadian Army warning detachments have been established at NORAD Regions and a liaison officer at HQ NORAD. Their tasks are to keep in touch with the air defence situation. There are various warning centres in Canada: the Federal Warning Centre (FWC) associated with Army Headquarters and the federal government; a Provincial Warning Centre (PWC) in each province. The FWC and PWCs have been located outside target areas. All of these are manned 24 hours every day and are in constant communication.

The decision to sound the "alert" is made at the federal level. The "take cover" may be ordered by the army at federal or provincial levels. Teletype circuits connect all warning centres

for the immediate passage of orders or information. Sirens are sounded from the warning centres. Equipment is on order so that all sirens may be sounded instantaneously from the FWC. Circuits have been installed to connect all warning centres to the CBC to permit the broadcast of detailed instructions to the public. Warnings and instructions concerning radioactive fallout would be carried over this same system. Authority has been granted to extend siren coverage in municipalities and to obtain the equipment that will permit operation at speeds consistent with the coming missile threat.

Sirens are not the complete answer to alerting the public. They are particularly effective as outside warning devices but are less effective indoors. An indoor warning device known as the National Emergency Alarm Repeater, or NEAR System is under study. This system operates over power lines and can provide a warning in any building connected to the power networks. The technical implications and costs of adoption of the NEAR System are being assessed.

Nuclear Detonation and Fallout Reporting System

Nuclear detonations might occur over target areas in Canada; random bursts might occur anywhere. Fallout patterns vary with the wind and weather. Our proximity to probable major target areas in the USA constitutes a serious hazard to Canada. There could be a serious radiation situation in Canada without a single nuclear weapon having fallen here. Close liaison has therefore been established with appropriate agencies in the U.S.A.

A nuclear detonation and fallout reporting system which is presently being established, must include the following essential components:

a. A means of locating a nuclear detonation and determining the size of bomb, the time of the detonation, and the height of burst. Three reporting posts have been located around each of our likely targets. Advantage has been taken of existing Department of National Defence or other federal installations. Personnel to man these posts are drawn from the parent installation and suitable equipment has been provided so that they may carry out their tasks on an interim basis. Further equipment is on order to give these posts a more complete capability.

b. These reporting posts must report to nuclear analysis and fallout prediction centres located in provincial warning centres. The information is assessed in relation to the current surface and upper wind forecast and a fallout prediction as to the areas that may be affected is passed out to the public by the warning system. These predictions are made now every day, twice a day, for training. We would have immediate information if a nuclear strike occurred without warning.

c. There must be a means for measuring actual fallout as it spreads down-wind from the point of burst. Fallout reporting posts are being located with existing installations of various federal departments and with a number of other agencies. This system will involve some 2,000 stations throughout the country, equipped with radiation measuring equipment. Extra equipment will be installed in about one-third of these posts to enable them to determine the location of random bursts.

d. A nuclear data collection agency has been established in the Federal Warning Centre.

e. The system must be tied together with communications that will remain in operation following an attack.

All of these posts must be given fallout protection if they are to be effective when fallout is down. Construction has started on this.

A national system cannot provide the intimate information of nuclear radiation and contamination on a block-by-block or farm-by-farm basis. There is a definite need for such an organization at municipal and county levels. Plans are being developed for this and the Federal Government has bought some equipment so that provincial and municipal agencies will be able to undertake the establishment of radiation monitoring elements in their areas of responsibility.

Re-Entry Operations

The aim of re-entry operations is to save lives. Activities include rescue, first aid, and the evacuation of survivors from the immediate area of damage. They also include sorting the casualties and preparing them for movement to hospitals; the deconta-

mination of survivors and equipment; the control of traffic and movement of people in the damaged areas; the direction of police and fire services; the restoration of certain utilities.

It seems reasonable to think of the post-attack period in three phases:

1. The life-saving phase — a period lasting only two or three days, though possibly a day or so longer;

2. The survival-of-the-nation phase — a period when other emergency work, less urgent than life-saving, takes place;

3. The restoration phase — a period that will go on for a very long time before the nation is restored to what will be normal conditions following the attack.

In re-entry operations only the life-saving phase is considered.

If our target cities were struck by nuclear weapons, there would be two immediate problems of overwhelming importance. These would be to establish, or re-establish control in the stricken areas and to bring to bear as large a rescue force as possible in those areas. Experience in peacetime and wartime disasters has shown that very little rescue can be successful after 48 hours have elapsed. The first few minutes or the first hour or two would be vital, but it is in this same time that there would be the greatest confusion, chaos, and disruption of the normal means of communication. For this reason, plans must be capable of being implemented either automatically or, alternatively, with the very minimum of orders from superior authority. This means that authority must be decentralized. It is essential also to have variations in the plan prepared and rehearsed to take account of unusual winds or unexpected patterns of attack. The plan must be simple and clearly understood by all those taking part in it. Rehearsals are of paramount importance.

Success in re-entry operations demanded the establishment, in peacetime, of headquarters associated with each probable target area. These have been established — one target area headquarters for each of the 16 likely target cities. A commander has been nominated in each case and the headquarters are manned by skeleton staffs. Target area headquarters staffs have to work in close cooperation with officials in the municipalities concerned. One would hope that if municipalities were considering the establishement of emergency headquarters clear of possible areas of damage, they might think of doing this in conjunction with the army. If they could locate their emergency headquarters near the target area headquarters, coordination in the event of emergency would certainly be facilitated.

There is a common pattern of behavior in disaster. People converge on the scene and their movement is almost automatic. It has been found that there are definite types of motivation for this: the returners, the anxious, the helpers, the curious, and the exploiters. Experience has also shown that any attempt to restrict movement and disperse the convergers is usually unsuccessful. Regardless of the motives of these people, they carry out useful work, especially when leadership is provided. It behooves us, therefore, to have an organization that will accept these convergers, direct their efforts in accordance with a sensible plan, and thus make maximum use of immediately available manpower. With this point in mind, we are attempting to establish militia units in appropriate places.

There is, in addition, a need for a warden service made up of people trained for emergency action. The wardens are needed to organize survivors immediately, to commence fire fighting and, through their leadership and advice to the survivors, keep down initial chaos and confusion. Surviving members of the regular forces and militia in the stricken areas would also play important roles in this regard.

The organization for rescue work has been changed to include smaller rescue units than we originally envisaged. Each unit is formed on the basis of a rather large cadre, from the regular army or the militia. Civilians would only be needed for the very few days of the life-saving period. Over two hundred of these columns will be established and equipped. These Mobile Survival Columns will operate under the control of Mobile Survival Groups. The latter will be made up of one or more Mobile Survival Columns plus the various supporting elements that

are needed for communications, decontamination, road clearance and heavy rescue work, feeding, transportation, etc. Staffs at Army Headquarters, Commands and Areas are conducting detailed planning so as to be able to provide these units as early as possible. Training has proceeded satisfactorily with the result that both the regular army and the militia are thoroughly familiar with survival problems and how to cope with them.

When discussing re-entry operations, the three effects of a nuclear explosion must be considered. We will assume that a five-megaton weapon was detonated as a surface burst over a typical Canadian city and consider the results of blast, heat and radiation.

Blast

The damaged area is divided into four zones: A, B, C and D. The distances quoted are averages. The A-zone is an area of complete destruction of about two miles radius. The B-zone is an area of severe damage and extends to a radius of about five miles. Many heavily constructed buildings will remain standing but all will probably require rebuilding. The C-zone is an area of less severe damage whose radius would be about eight miles. Many buildings will be reparable. The D-zone is the final area of damage and extends to a radius of about 12 miles. In this zone the damage will be still less severe and, while repairs will be necessary, many of the buildings will remain habitable after the attack.

Heat

Many fires will be started in the centre of the city — some from the immediate effects of the explosion, others from secondary effects such as broken gas mains, short-circuited power lines, etc. Fires are likely to occur well beyond the range of blast damage. This fact emphasizes the need for training the public to prevent and control fires. 20 per cent of the fires could be extinguished if dealt with immediately.

Radiation

Initial radiation will be confined to a very small area within which there will have been complete destruction. We are particularly concerned with radioactive fallout. Casualty-producing contamination is likely to extend only a short distance up-wind but may extend 150 to 175 miles down-wind depending on the wind strength at the time. Limits must be set for radiation doses for those working in contaminated areas, if we are to avoid loss of personnel. With this in mind we have established maximum tolerable radiation doses for wartime operations. Workers should not normally be permitted to work in areas where the dose rate exceeds 10 roentgens per hour. Administrative units should not be sited in areas where the dose rate exceeds 1 roentgen per hour. To fix these boundaries, the 10 roentgens-per-hour line is marked as the Red Line and the 1 roentgen-per-hour line as the Green Line.

Casualties

Inside the A-zone the area of complete destruction, there would be no survivors. In the B-zone, those who took cover in the basements of heavily constructed buildings would likely be safe, possibly injured, and would need to be rescued. It is in the C-zone that the greatest rescue problem would exist. There would be many who could survive — even among those who were outside at the time of the blast — if they were brought out and given treatment quickly. In the D, or outer zone, there would be a good many minor casualties. In most cases they would not be seriously trapped by debris and would be able to get out with very little assistance.

It might be said that a target city would be completely obliterated and that there would be no point in shelters and little point in rescue. There are, however, errors in delivery — particularly if missiles are fired in quantity. Thus ground zero could easily be some distance from the centre of the city and the heavily populated portions could easily be in the C or D zones. If the weapon missed the city completely there would still be the radiation menace from this bomb or others and, therefore, fallout shelters would be useful.

Post-Attack

Immediately after an attack occurs, units of the re-entry force must react on the minimum of orders and, preferably, automatically. Target Area Headquarters would commence work at once and send out reconnaissance troops. Traffic Posts would be manned; other HQ personnel would go to their posts. Rescue and support units would assemble and would move to

their predesignated areas of responsibility. If the attack were significantly off the expected ground zero, some areas might not have been damaged as expected. Changes of wind might free certain areas from fallout but threaten others. Any orders to divert units from their planned routes and tasks would be sent by radio or through the Traffic Posts on the routes. Reconnaissance detachments would report damage, fires, and radiation intensities. From these reports Red and Green Lines would be established.

Rescue units would move in to the damaged area. Support units would establish mobile survival group support areas outside the Green Line as close as possible to their planned locations. Here centres would be established for decontamination of rescuers and rescued; for mass feeding; for change of rescuers' contaminated clothing and for pool of transport.

As rescue units and volunteers arrived from greater distances, or were recruited from among the rescued, further columns would be sent into the damaged areas. At that time it might be necessary to relieve the rescuers on a shift basis either because of fatigue or because the limit of radiation dosage had been reached. We would expect that rescuers would work 24-36 hours in the initial 48-hour period.

Road clearance and heavy rescue equipment and units would be provided by army engineers in the form of engineer composite squadrons. Roads would be cleared in accordance with a prearranged plan, adjusted as necessary by Target Area HQ. Heavy rescue work would be carried out in support of mobile survival columns.

Medical units would be set up on the axis of each mobile survival column just outside the Green Line. They would receive casualties brought out to the roads by rescuers and carried by transport to the medical sections. Here the casualties would be sorted and prepared for movement. Evacuation from these points is the responsibility of civil authority. Using the combination of regular columns and cadre columns that has been described, studies indicate that a high percentage of victims could be saved. It would be physically impossible to save 100 per cent of those requiring rescue. The militia training program of last winter improved the availability of trained personnel needed in the event of an attack on Canada. This will not, however, remove the need for civilian volunteers. It will mean that the army is in a better position to absorb volunteers and employ them to greater effect.

Recent deferrals in certain expenditures made necessary by the current foreign exchange emergency, have led to a review of some of our programs. Development and extension of the warning and nuclear detonation and fallout reporting systems will continue. The construction of regional emergency headquarters and the expansion of the Canadian Army's Signal System will be phased over a longer period. As the bulk of equipment needed by the Army in carrying out its re-entry and rescue functions has been delivered, capabilities in this regard will be relatively unchanged.

Conclusion

Much is said about apathy and defeatism in respect to civil defence. Sweeping statements have been made to the effect that, in the event of nuclear attack, the situation would be hopeless and the human race would perish. *On the Beach,* by Neville Shute, did tremendous damage by giving people incorrect information. The facts are entirely different. There is no question but that much can be done to save lives and property and to minimize the effects of these horrible weapons. Fallout shelters, if built, could save millions of lives in Canada. Adequate plans, if implemented at all levels of government, could save hundreds of thousands of lives. A *disciplined* rescue force, properly trained and adequately equipped, could save hundreds of thousands more lives.

We pray that war, particularly nuclear war, will never occur. But it is possible. We must know the problems that would face us and understand the great task that we would have to undertake. We believe that the problems *can be solved,* and the task can be undertaken.

EMERGENCY HEALTH SUPPLIES

J. EARLE MATTHEWS, PHM.B.

The over-all goal of the Health Supplies Section, Emergency Health Services Division, is to prepare a program that will assure the availability of adequate health supplies for the civilian population in the event of a national emergency.

History

In 1951, following reports of studies by various working parties and meetings of an Interdepartmental Committee, the Minister of National Health and Welfare reported to the Cabinet as follows:

1. That there was no reserve of essential health supplies in Canada, and for most of such items production required 12 to 18 months;
2. That approximately half of the material needed for emergency use was imported from the United States, the United Kingdom and other countries;
3. That initial steps should be taken to establish in Canada a stockpile of essential medical supplies for Civil Defence purposes, since following any wartime or large peacetime disaster such medical supplies are required in quantities much greater than community resources would be able to meet.

To this end, in 1952, the Federal Government accepted the responsibility of providing a national stockpile of health supplies in peace-time. Such a stockpile now exists and is being reorganized, maintained, and adjusted constantly to take into consideration all new planning. The original stockpile, authorized in 1952, was worth $9,000,000. It was increased in 1957 to $11,000,000 because of the large A-bomb. In 1960 the first phase of the emergency hospital program was approved which increased the stockpile to $18,025,000.

Emergency Health Services Division is of the opinion that a stockpile alone is not sufficient to meet the problem, but that other arrangements must be made to support it if the efforts of the health professions are to be effective in a mass casualty care program. E.H.S. is planning a resources program that will provide information regarding the supplies required for a six-to-twelve-month rehabilitation period.

Purpose

The main purpose of the Emergency Stockpile Program is to have large quantities of essential health supplies strategically located across Canada so that they will be available in the immediate post-disaster period. This

stockpile must be developed in peacetime.

Scope

The Emergency Health Supplies Program is being developed in accordance with the terms of reference for the Federal Emergency Health Services Division, Department of National Health and Welfare, as follows:

1. To determine the requirements of essential health supplies for use by a civilian medical service during the emergency and rehabilitation period.

2. To maintain a national stockpile of essential health supplies.

3. In cooperation with the Emergency Supply Planning Branch, Department of Defence Production, to study and assist in the development of techniques for the control and distribution of health supplies.

4. To study the capability of pharmaceutical, medical and hospital suppliers, and associated industries to restore production during a period of emergency.

5. To assist in planning measures for the preservation of facilities for the production of essential biological materials.

The stockpile will provide supplies for 21 days after an all-out nuclear attack on Canada. This provision for the "acute" or post-attack period affords a potential for regional self-support until transportation facilities are available to move in additional health supplies for the later rehabilitation period.

The quantity of supplies and the medical units to be organized to use them were determined after giving careful consideration to the manpower potential in Canada of medical and dental practitioners, nurses, pharmacists, and members of other health professions. The stockpile will provide the Emergency Health Services with equipment for medical units and for resupply and training as follows:

600 Advance Treatment Centre Operational Units

600 Casualty Collecting Units

Backup hospital supplies for 200,000 casualties at emergency and existing hospitals

28 Emergency Blood Services Shadow Depots

2800 Hospital Disaster Units no. 1

200 Emergency Hospital Operational Units

100 Basic Clinical Laboratories

20 Transportable Public Health Laboratories

400 Emergency Clinics

30 Advance Treatment Centre Training Units

16 Emergency Hospital Training Units

2 Emergency Blood Services Shadow Depot Training Units.

Organization of Emergency Health Supplies Service

1. *Planning Committee:* The planning for the stockpile program is done by a subcommittee to Emergency Health Committee in Emergency Measures Organization, with membership from the Department of Veterans Affairs; the Canadian Forces Medical Service, Department of National Defence, and Emergency Health Services, Department of National Health and Welfare.

2. *Over-all Supervision:* This is carried out by Emergency Health Services Division, Department of National Health and Welfare.

3. *Direct Supervision:* The Health Supplies Section, Emergency Health Services Division has the following responsibilities with respect to this program:

a. To provide a pharmaceutical and health supplies consulting service.

b. To implement the following functions: Procurement, packaging and marking, warehousing, distribution, inspection and rotation of dated and perishable supplies.

c. To train and organize pharmacists and allied pharmaceutical personnel into an effective Emergency Health Supplies Service.

d. To organize and implement a resources planning program for all health supplies.

The program is under the direction of a pharmaceutical consultant who has five officers and a secretarial staff to assist him.

Stockpile Management Program

1. *Procurement:* Emergency Health Services Division is coordinating its procurement program with the Surgeon General's Office, Department of National Defence, and with the Department of Defence Production. Emergency Health Services Division determines the items to be obtained and supplies the funds.

When a requisition reaches the office of the Surgeon General, it is treated in the same manner as a National Defence request. The contract demand is prepared and forwarded to the Department of Defence Production for procurement action. The contract is then prepared and released by this department. The Inspection Service, Department of National Defence, inspects all items to the terms of contract and specifications before they are delivered. The items are received by Emergency Health Services Central Depot in Ottawa where they are accounted for while awaiting packaging.

Wherever possible, Department of National Defence specifications are used. If no acceptable specification exists, E.H.S. prepares one or has it prepared for them by a government agency.

2. *Packaging and Marking:* The tremendous quantities of supplies stored in warehouses across Canada in vendors' cartons will be of very little value if they are not packaged for rapid distribution and for immediate use.

The standard packages or cartons received from the manufacturers are acceptable in normal peacetime warehousing and shipping. However, Emergency Health Services medical units must be in operation in a matter of *hours,* not days. Any special packaging or arrangement of these supplies must be done in peace-time as the supplies for each unit are being assembled.

The Packaging Unit of E.H.S. is doing a pre-issue of the supplies that each area or functional sub-unit of a medical unit will require. The supplies are packaged and marked for each particular area. This will allow the medical unit to start to work at once with a minimal number of issues from the supplies area.

Method of Assembling Supplies

1. *Operational Units:* These will be packaged functionally so that the unit may go into action without delay.

2. *Replenishment Units:* These units will contain the supplies for a specific number of casualties, and will be released to medical units as requested. These re-supply units will be assembled by using the cartons, boxes, crates received from the manufacturers. This type of arrangement of supplies will allow for individual issues to meet large or small demands.

3. *Bulk Supplies:* Emergency Health Services realizes that all areas will not receive the same number or types of casualties. Therefore, provision is being made for large issues of single items. The bulk items will be stored in the cartons, boxes and crates received from the vendors. Supplies warehoused in this manner will allow for large or small issues.

Storage

Because of the factor of distance, Canada cannot be served quickly or efficiently from one central warehouse, even in peacetime. In time of emergency transportation will be disrupted and under reorganization for a period estimated up to 30 days.

The supplies are being placed in National Defence depots for the following reasons:

1. It was considered advisable not to set up another warehouse system, but to expand the existing one wherever possible.

2. The rotation program with respect to dated and perishable items can be very effectively implemented by the Department of National Defence warehouse system.

3. The location of these depots affords a great deal of security with respect to narcotics.

The quantity of supplies assigned to each depot depends on the population to be served, the priority of the target area, and other related factors.

The storage of Emergency Health Supplies will be under federal direction and advice at all times. It will be carried out on the following principles:

1. *Central storage:* Emergency Health Services is using a depot in Ottawa as the marshalling area for all supplies to be assembled into medical units or that require any special packaging. When the supplies have been packaged, they are shipped to regional depots or directly to a province for storage.

2. *Regional storage (federal control):* The supplies assigned to these depots will make a region self-supporting up to 30 days and will assist in making the nation self-supporting for six months.

3. *Zone Depots (provincial control):* In

order to bring the supplies as close as possible to the organized units, it will be necessary for each province to organize a depot system that will meet the requirements of the federal government. The most important depot in their system will be a warehouse in each zone under the control of the provincial Emergency Health Services. The supplies in all of the zone depots should make a province self-supporting for 30 days.

4. *Medical Centre Depot (provincial and municipal control):* It will be necessary for each medical centre to earmark a building in peacetime that can be used in wartime as a depot. The size will depend on the nature and magnitude of the task assigned to that particular centre. The quantity of health supplies should be sufficient to enable a medical centre to be self-supporting for seven days.

5. *Target area (target area headquarters control):* Each target area will be required to organize depots or dumps in numbers sufficient to store adequate supplies for the medical task assigned to it, and to make the target self-supporting for seven days.

6. *Pre-positioned supplies:* An arrangement will be made with each province to pre-position, in peacetime, Advanced Treatment Centres, Emergency Hospitals, Emergency Blood Shadow Depots and other Emergency Health Services supplies needed in the post-disaster period. An organized medical unit can be an existing hospital or the headquarters of a provincial public health unit. The supplies will be stored at the hospital or at the site where the hospital will use them, whereas the public health unit will store them at their headquarters and will issue them to an organized medical unit. All pre-positioned supplies will be in the custody of an organized medical unit. The Department of Health of the province concerned will have over-all responsibility for them.

Criteria for Control of Stockpile

The stocks in each region will be allocated as federal reserve, provincial allotment, or provincial allotment for a province without a regional depot.

The *federal reserve* will be those health supplies that will not be needed in the first 30-day period. They will remain under federal control and will be released *only* by central federal authority. This quantity will be approximately 40 to 60 per cent of the entire stockpile.

The *provincial allotment* will be those supplies that will be needed to make a province self-supporting for a period of 30 days. They will be subdivided as a provincial quota or as a regional-provincial reserve.

The *provincial quota* will be those supplies that can be allotted in peacetime to an organized medical unit for storage and supervision. If the total quota is not pre-positioned in peacetime, the remaining portion in storage can be released for use to a province by a regional Federal Health Services officer without central federal authority in order to meet the provincial needs for disaster under wartime regulations. The provincial quota will be determined by provincial planning, and could be from 25 to 30 per cent of the total supplies for a region.

The *regional-provincial reserve* will be the remainder of the supplies in the provincial allotment but it will be under central federal control and will require this authority for release at all times. However, if communications with the central federal site are interrupted, the regional Federal Health Services officer will have the authority to release these supplies as and when they are required to meet the demands of organized medical units. The demands made on regional headquarters during this period, or at any time, should be for actual needs, and not for anticipated requirements. When communications are restored, the regional Federal Health Services officer will notify central Federal Control Site of the quantity of supplies issued, and central Federal authority will be restored.

Rotation of Dated and Perishable Goods

1. *Federal level:* This will be carried out in cooperation with Canadian Forces Medical Services, Department of National Defence; Treatment Service, Department of Veterans Affairs; and Medical Services Directorate, Department of National Health and Welfare.

2. *Provincial level:* This will be developed as the need arises.

Resources Planning Program

At the time of a nuclear war, the War Measures Act will bring into be-

ing a War Supplies Agency, charged with the responsibility and authority for all aspects of control over production, distribution and pricing of supplies, both civil and military. The Emergency Supply Planning Branch is the peace-time planning agency for the War Supplies Agency.

Emergency Health Services furnishes the Emergency Supply Planning Branch with information about all health supplies. In order to accomplish this, a resources planning unit has been established in the Health Supplies Section, E.H.S. It will evaluate the requirements for health resources, such as medical supplies and equipment, and assess the ability to utilize such resources; estimate the post-attack discrepancy between supplies and requirements and recommend procedures to overcome this.

The responsibility for health supplies was left with E.H.S. for several reasons:

1. Their relationship to the health professions and their associations;
2. their relationship to pharmaceutical and allied industries;
3. their relationship of resources planning to the stockpile.

Organization of Pharmacists

Since 1955, the pharmacists of Canada have indicated to the Federal Emergency Health Services that they are prepared to assume staff appointments at all levels of control as full-time officers or on a voluntary basis. Several provinces have named volunteer pharmacists to positions. They are assisting the provincial Health Supplies officer with the development of provincial Emergency Health Services.

In Memoriam

Isabel Matilda Baird (Providence General Hospital, R.I.) died in Port Arthur, Ont. on November 11, 1962. During her 40 years in the nursing profession, she had been employed in administrative positions in Canada and the United States. Ill health brought about her retirement early last year.

* * *

Margaret Battley (Royal Victoria Hospital, Montreal '24) died on October 18, 1962 in Long Beach, California.

* * *

Carma Marie Bowen (Grace Division, Toronto Western Hospital '30) died in October, 1962. She had engaged in private nursing.

* * *

Joan M. Bradd (Princess Alice Memorial Hospital, Eastbourne, England '53) died late in 1962. She was on the staff of the Canadian Red Cross Society.

Catherine Margaret Gertrude (Maynard) Bunyan (Vancouver General Hospital '35) died during October, 1962.

* * *

Marie E. Cantin (St. Vincent de Paul Hospital, Sherbrooke, P.Q. '26) died in Montreal on October 3, 1962. As a staff member of the Metropolitan Life Insurance Company, she was made responsible for the educational program of the company nurses. In addition she took an active part in the activities of the ANPQ. Following her retirement in 1952, she returned to active duty once again as a student counsellor at Hôpital St-Luc, Montreal. Miss Cantin was 73 years of age.

* * *

Anna Mildred (Chalk) Carlson (Grace Hospital, Toronto '20) died on October 21, 1962. She had engaged in institutional nursing.

Reduction of Fallout Radiation Hazards

W. R. WATERS, M.SC.

An effect of a nuclear weapon that is of great concern to the general public is the phenomenon of radioactive fallout. This return to earth of the radioactive products of the bomb, together with debris from the target, results in the "dusting" of large areas with radioactive matter whereby environments of radiation of varying intensity are produced. The exposure of people to such environments constitutes a health hazard that varies in seriousness from mild sickness to death.

Introduction

Hospitals, by their nature and function, are sensitive to the consequence of involvement in radioactive fallout. Medical directors and hospital administrators constantly seek advice from Emergency Health Services concerning the radiation hazard to their patients and staff that might arise in the event of nuclear war. They want to know how such hazard may be combatted.

It is important to understand that the amount of radioactivity associated with a nuclear weapon is not measured by the energy yield of the weapon but by the amount of the weapon yield constituted by the fissionable component.* Fallout radiation is basically a side effect of a nuclear reaction. The blast and heat are the primary military tools. Bigger bombs do not necessarily mean larger quantities of radioactive products in the fallout. Technical advances in bomb design will undoubtedly result in a continuing reduction in the fission-fusion ratio, but it is improbable that a nuclear weapon will ever be completely free of radioactivity.

An important factor from our point of view is that Canada constitutes the fringe of the North American nuclear battleground. This means that the distribution of fallout will show greater variation from south to north and east to west in Canada than in the United States, even taking into consideration vehicles destroyed in transit. Nonetheless, large numbers of the Canadian population risk danger from fallout radiation.

The Occurrence of Fallout

Owing to variations in meteorological conditions from day-to-day, together with variations in weight and distribution of an actual thermonuclear attack, it is not possible to state quantitatively in advance the radiological environment that will exist at any specific point on the day of an attack. This does not mean that a reasonable

*That is, the uranium or plutonium that must react first in order to provide the energy necessary to start the hydrogen reaction.

evaluation of the range of radiation intensities and the probability of their occurrence may not be obtained by previous theoretical consideration.

Since the distribution of fallout debris is largely dependent on the speed and direction of the stratospheric winds, it can be calculated mathematically for any particular vector and stated attack pattern. Such a study has been made for Canada by Canadian Army Operational Research Establishment.[1] Included are about 500 points of interest to E.H.S.

Shielding

A further important pre-attack contribution to radiation protective measures is the assessment of available radiation shielding capability and the improvement of shelter facilities. This shielding capacity is usually expressed by the term "protection factor."

Protection factor may be defined as the number of times the shielding structure reduces the intensity of the radiation as it penetrates into the structure. Any structure may be assessed for protection factor by a mathematical procedure employing a knowledge of materials, the method of construction and a plan of the building.

Dosage Limitations

For the health protection of the public, it is desirable to attempt to limit exposure to 25 roentgens during the three month post-attack emergency period. This figure has been arrived at from the maximum "once in a lifetime" dose for occupational workers in the radiation field recommended by the International Committee for Radiation Protection. It is not to be regarded as a hard figure but as a value below which we should endeavor to keep exposure and above which exposure may be incurred reluctantly.

Those who are engaged in survival operations must accept somewhat greater health risks. For these people an exposure of 100 roentgens in a period of up to six weeks may be incurred as an operational necessity. For periods greater than six weeks the maximum aggregate limit of exposure should be no more than 200 roentgens. These are the limitations that we seek to place on exposures to gamma radiations. Locations of health installations and shielding capacities of structures should be examined with these criteria in mind.

Where persons experience exposures of gamma radiation in excess of 100 *r* in a 96-hour period, sickness is increasingly likely to occur. Where the exposure is 600 *r* or more in the same period, most persons will die. Hospital patients suffering from disease or traumatic injury are more sensitive to radiation than healthy persons and the consequences of exposure to much lower dosages than the above would be serious.

Classification of Hospital Locations

From the study of fallout distribution probabilities a comparative classification of points where hospitals of interest are located throughout the country can be made. This classification is based on the chance that a certain exposure level may or may not be exceeded. The index exposure taken in the first instance is 600 roentgens unprotected exposure during the 96-hour period after arrival of fallout. The period "96 hours" is regarded as that during which the received dosage would have maximum biological effect. Any further exposure would not add significantly to the injury. The implication is that patients and health workers would receive not more than 20-25 roentgens during this period provided that their hospital had some area where the protection factor was at least 25. In most cases, it is possible to provide shelter accommodation in hospitals where the protection factor would be 100 or better, either through utilization of existing space or through improvement in the protection factor of the most sheltered area in the hospital.

Another index that may be obtained from the distribution data, is the hour when the exterior intensity at the particular location will have fallen to 10 roentgens per hour or less on 90 per cent of the occasions that fallout could occur. An intensity of 10*r*/hr is the limit above which re-entry into the area will not be attempted. A third method of utilizing fallout information is to tabulate the range of exposures likely to be encountered 50-90 per cent of the time.

The list may be obtained from E.H.S. by interested officials.

The classification system according to fallout distribution probability is:

Class A locations: Those in which there is 0-15% probability that exposure will exceed 600 roentgens.

Class B locations: Those in which there is 16-25% probability that exposure will exceed 600 roentgens.

Class C locations: Those in which there is 26-35% probability that exposure will exceed 600 roentgens.

Class D locations: Those in which there is 36-45% probability that exposure will exceed 600 roentgens.

Class E locations: Those in which there is 46% upwards probability that exposure will exceed 600 roentgens.

Accessibility depends upon whether or not the establishment is open to use either 24 or 48 hours post-fallout. The system which results is exemplified as follows:

Table I

Location	*Installation*	*Acceptability at the 600 rad level*	*Accessibility: 90% of the times* H + 24 hrs.	H + 48 hrs.
Cochrane	Lady Minto Hosp.	A	Yes	
Carleton Place	District Memorial Hospital	B	Yes	
Brockville	General Hospital	C	No	Yes
Brampton	Peel Memorial Hospital	D	No	Yes
Brantford	General Hospital	E	No	No

At the same location the range of exposure with a 50% to 90% probability of occurring would be:

Table II

Location	
Cochrane	0.0*r*— 194*r*
Carleton Place	120*r*—1380*r*
Brockville	185*r*—2242*r*
Brampton	365*r*—2390*r*
Brantford	650*r*—3600*r*

The director of any of the listed hospitals can obtain an idea of the dimension of the radiation hazard in the area of his establishment. This will be useful in determining how much more than 100 the protection factor must be. It will provide an indication as to the length of time that the establishment might be isolated.

The list can be used by officials who are faced with the problem of selecting an emergency site for possible pre-attack evacuation purposes, and by those who have the responsibility for pre-positioning stocks of emergency health stores. There are many other problems that guidance from such studies may help to solve.

On a national scale Table III shows examples of exposures that might be experienced in various areas in Canada. There are large areas in the northern and western parts of the country where high radiation intensities, arising from nuclear strikes on large cities and other targets in Canada and the northern United States, are unlikely to be encountered. In these areas, the unprotected external exposures will rarely exceed 200 to 300 roentgens and during most days of the year these values might only be one-tenth as great.

This is the sort of radiation environment that the health professions may expect to encounter in Canada in the event of nuclear war. In general, locations farther away from targets will be increasingly less affected by changes in the weight of attack.

Because hospital patients are particularly sensitive to gamma radiation and because the radiological life of scarce health manpower must be conserved, it is important that the shielding capability of establishments be known to those officials responsible for the health of patients and staffs.

Table III

Location	*Classification*	*Accessibility* 24 hrs.	48 hrs.		*Probability of over 600r exposure* %	*Expected range of exposure 50-90% of the time*
Newfoundland	All areas are class A					
Botwood	A	Yes			0	0— 150*r*
Cornerbrook	A	Yes			7	40— 500*r*
P.E.I.	Mainly C and D classes					
Charlottetown	D	No	Yes		36	408—1600*r*
Montague	A	Yes			18	214— 900*r*
Nova Scotia	Mainly classes C, D and E					
Amherst	D	Yes			38	400—1450*r*
Yarmouth	E	Yes			48	540—1300*r*
Inverness	A	Yes			13	190— 700*r*
New Brunswick	Mainly Classes D and E					
Dalhousie	B	No	Yes		24	60—1500*r*
Tracadie	B	Yes			18	270— 800*r*
Newcastle	D	No	Yes		37	200—2500*r*
St. Stephen	E	No	Yes		49	575—2400*r*
Quebec	All classes are encountered in Quebec. The worst areas are those east of Montreal. Better areas are in the north.					
Amos	A	Yes			1	0— 200*r*
Bedford	E	No	Yes		51	603—3000*r*
Plessisville	B	No	Yes		25	158—1500*r*
Drummondville	C	No	Yes		28	327—2000*r*
Magog	E	No	No		61	984—4000*r*
Levis	A	Yes			13	130— 900*r*
Ontario	The worst area of Ontario lies south and south-west of the line Orillia/Perth. North of Georgian Bay and Lake Superior, mainly classes A and B.					
Belleville	D	No	Yes		40	350—2700*r*
Clinton	D	No	No		44	514—4300*r*
Exeter	E	No	No		52	700—4600*r*
Sioux Lookout	A	Yes			1	0— 400*r*
Timmins	A	Yes			2	0— 250*r*
Sudbury	B	Yes			24	61—1000*r*
Parry Sound	C	Yes			34	28—1200*r*
Manitoba						
Saskatchewan	Almost completely class A					
Alberta						
Portage-la-Prairie	A	Yes			7	0— 117*r*
Selkirk	A	Yes			13	0— 800*r*
Flin-Flon	A	Yes			0	0— 41*r*
Steinback	C	No	Yes		31	170—1500*r*
Unity	A	Yes			1	0— 300*r*
Swift Current	A	Yes			2	0— 180*r*
Ile a la Crosse	A	Yes			0	0— 27*r*
Meadow Lake	A	Yes			11	25— 660*r*
High River	A	Yes			12	0— 700*r*
Grande Prairie	A	Yes			0	0— 0*r*
Edson	A	Yes			1	0— 0*r*
Lethbridge	A	Yes			7	0— 510*r*
Tofield	A	Yes			11	75— 700*r*
British Columbia	Except for two or three locations B.C. is class A					
Duncan	A	Yes			14	0— 670*r*
Hope	B	Yes			29	59— 900*r*
Nanaimo	B	Yes			17	12— 900*r*
Abbotsford	C	No	Yes		32	247—1600*r*
Revelstoke	A	Yes			2	0— 0*r*

Table IV

Factors Influencing Roof and Ground Contributions

Roof Contribution	*Ground Contribution*
1. Height of roof above detector	1. The mass of the exterior walls
2. Area of roof	2. The perimeter of the structure
3. Total overhead mass	3. The amount of openings
4. Interior vertical partitions	4. Any interior partitions
	5. The exterior environment

Evaluation of Buildings

The Emergency Measures Organization conducts courses to train engineers and architects in methods to evaluate the shielding capability of any structure and to increase that capability[2]. The exact evaluation of a hospital should be made by an engineer so qualified. However, some account of the principles and influencing factors may be of use to hospital directors and others in making a preliminary survey of buildings.

Basically, the dose receivable inside a structure can be divided into two parts: That delivered from fallout on the ground surrounding the structure; that lying on the roof of the structure. These are commonly referred to as the "ground contribution" and the "roof contribution." Each is influenced by the structural characteristics of the building.

Structural materials do not have the same capacity for absorbing (shielding against) gamma radiation. It is convenient to establish a standard method of comparing the attenuating capacity of the many different types of building materials, in order that the sum of their effects may be expressed as a single figure. The unit employed for this purpose is the "mass thickness." The mass thickness of a given material is the weight per square foot of a stated thickness of the material.

From these figures and the specifications of the building, the total mass thickness of the walls and the roof can be computed. These values, together with a correction for openings and the characteristics previously mentioned, yield a figure known as the "protection factor" of the building.

In an area that is to be used as a shelter during fallout, normal openings must be filled in and baffle walls provided in front of doorways and essential passages. The total mass thicknesses of the walls and the roof should be about 200-250 for the walls, and 125-175 for the roof, in order that the area enclosed will have a protection factor of 100.

The protective qualities of a building can be considered in the following terms:

1. What is the roof area? Large roof areas tend to reduce ground contributions.
2. How high is the roof? High roofs reduce the roof contribution to basements and first floors.
3. How much overhead mass-thickness?
4. What is the mass-thickness of the perimeter walls?
5. What percentage of the perimeter is comprised of openings — doors and windows? The more openings, the greater the ground contribution.
6. What is the mass-thickness of interior partitions? Partitions reduce both roof and ground contributions.

Table V

Item	*Thickness*	*Mass Thickness lbs/sq. ft.*
Brick, Common	1"	8 to 16
Concrete	1"	12
Concrete Block (Hollow)	4"	30
Cinder Block	1"	8.5
Wooden Flooring	3/4" on 1" sub-floor	10
Plaster	1/2" to 3/4"	5 to 6
Plaster Ceiling		10
Plywood	3/4"	1
Roofing - 5 Ply - Gravel		7
Stone Masonry	1"	5
Structural Tile	8"	42

It is clear that basements are areas of high protection and that sub-basements are very high. Basement space, if present, may not be sufficient, or there may be operational reasons why all or part of the first floor must be used. These facts must be taken into consideration in planning.

There is another aspect related to shelter, but not to radiological protection — the question of habitability. This is of particular significance when considering basements and sub-basements as shelter areas. Factors essential to healthy habitability are:

1. Proper ventilation; 2. sanitary facilities; 3. adequate food stocks; 4. adequate water supply — ideally a well; 5. sufficient bed and working space; 6. heat and fuel; 7. necessary medical requirements.

When an estimation of a building's strengths and weaknesses has been made, the medical director or hospital administrator can decide what areas are possible for use as radiation shelters. It is unlikely that any hospital will have an area that does not require improvement in order to be usable as a fallout shelter. Even large institutions with sub-basements that have high protective factors will find that changes and additions will be necessary to make the area habitable.

Improving the Protection Factor

Inspection of the building yields a good idea of its general value as a shelter. Good and bad areas are noted.

1. Fill (or provide for filling of) openings such as windows and unnecessary doorways with concrete blocks.

2. Increase the mass thickness of exterior walls.

3. Increase the total overhead mass thickness i.e. sum of the roof and intervening floors.

4. Increase the mass thickness of selected interior walls to provide improved local areas.

It is usually cheaper to thicken walls than ceilings and, for engineering reasons, there is a limit to the amount of additional weight that ceilings and roofs can withstand.

Table VI

Distribution of Added Mass Thickness

It is usually more economical to put mass thickness into walls than into roofs. Arrange things so that the roof contribution to the total dose is about 50% more than the ground contribution .

To achieve P.F. 100

Roof Contribution	0.006
Ground Contribution	0.004
Roof Mass Thickness	150
Wall Mass Thickness	225

To illustrate the application of the principles and methods described, two studies that Emergency Health Services and the Hospital Design Division of the Department of National Health and Welfare have made are presented. Both concern 50-bed hospitals that differed greatly in design and structural materials.

The Almonte Hospital

This is a 50-bed, basementless hospital of two floors. The area suitable for use for shelter was the ground floor after the protection factor had been suitably increased.

The specifications of the building "as is" were:

Area:

65 ft. x 182 ft. giving 11,800 sq. ft.

Construction

Main Building	***Mass Thickness***
Roof:	
Tar and gravel	
2" rigid fiber board	54
2½" reinforced concrete slab	
2nd Floor:	
Linoleum	
2" cement	66
2½" reinforced concrete slab	
Metal lath and plaster	
Total overhead mass thickness	120
Exterior walls:	
4" brick	
8" hollow tile	81
Plaster on styrofoam	
Typical Interior Partitions:	
4" hollow clay tile plastered on both sides	20

Per cent distribution of openings in exterior walls

	N	E	S	W
Main Floor	21	11	28	17
Second Floor	23	14	21	17

Analysis of this structure shows the index figures found in Table VII.

Table VII

DATA ON ALMONTE HOSPITAL
GROUND FLOOR AREA "AS IS"

Total Overhead Mass Thickness		120 P.S.F.
Total Mass Thickness of Exterior Walls		
	N	63 P.S.F.
	E	111 P.S.F.
	S	121 P.S.F.
	W	107 P.S.F.
Total Roof Contribution		0.0128
Total Ground Contribution		0.036
Reduction Factor		0.0488
Protection Factor		20.5
i.e. 1		
0.0488		

In order to provide a protection factor of 100, it was necessary to bring the overhead mass to about 125-150 p.s.f. and the wall mass thickness to about 200-250 p.s.f. How was this increased protection obtained? The recommendations were as follows:

To increase the overhead mass thickness

1. Add 1" dry roof gravel to roof.
2. Add 1" metal lath and plaster to the ceiling of the ground floor.

To increase the exterior wall mass thickness

1. Add 8" solid concrete block to walls (inside *or* outside).
2. Close some window openings with 4" brick, and 12" solid concrete block and plaster.
3. Be prepared, as an emergency, to block remaining window openings with 16" solid concrete blocks.

Be prepared to screen essential door openings with 16" concrete block baffle wall.

In achieving this the values in Table VII[1] were obtained.

Table VII[1]

DATA ON ALMONTE HOSPITAL
GROUND FLOOR AREA "IMPROVED"

		Increment
Total Overhead Mass Thickness		
	= 140	23
Total Mass Thickness of Exterior Walls		
	N 177	114
	E 217	106
	S 237	116
	W 217	110
		Decrement
Total Roof Contribution	0.0077	0.0051
Total Ground Contribution	0.0013	0.0347
Reduction Factor	0.0090	
Protection Factor	111	

The Sackville Hospital

This also is a 50-bed hospital. The building had a large percentage of the structural members of lumber. It consisted of a semi-basement and an upper floor. The walls of the semi-basement were of reinforced concrete but the main exterior walls were only 4½" brick on a wood frame. It was clear that the obvious area for shelter would be the semi-basement. The existing protection factor was only 9. This was due to the poor overhead mass. The outline specifications for the building were:

Attic	***Mass Thickness***
Roof:	
Asphalt shingles	
⅞" wood sheeting	6
2" x 7" joists @ 16" o.c.	
Floor:	
Aluminum foil	
3" insulation wool	6
3" x 9" @ 16" o.c.	
1" x 3" strapping @ 16" o.c.	
Wood lath and plaster	
Main Floor	
Floor:	
¼" linoleum	
½" plywood	
4½" solid wood	16
1" x 3" strapping @ 16" o.c.	
¾" wood lath and plaster	
Total Overhead Mass Thickness	32
Exterior walls:	
4½" solid brick	
⅝" fibreboard	43
2" x 5" @ 12" o.c.	
¾" wood lath and plaster	
Semi-basement	
Exterior walls above ground:	
4½" solid brick	
7" reinforced concrete	
2" x 2" strapping @ 16" o.c.	101
¾" wood lath and plaster	

To achieve a protection factor of 100 in the semi-basement of this building requires that the overhead mass thickness should be brought up to about 140 p.s.f. and the exterior walls to around 200 p.s.f. This can be done by the addition of an 8" layer of concrete and 1" metal lath and plaster to the basement ceiling. The above-grade basement walls require an additional layer of 8" concrete block and a layer of lath and plaster. Window openings should be filled (or be capable of being filled in emergency) with 12" concrete blocks. Door openings should be screened with a 12" concrete baffle wall. The protection factor provided by these improvements will be 110.

What then has been gained by these improvements? In each of these hospitals a shelter area capable of functioning and housing the patients and staff under the emergency conditions of radioactive fallout has been provided. The protection factor in each instance was brought up to a value of 100. Thus even in areas where the critical 96-hour exposure in an unshielded locality is 2500*r*, the patients and staff in the shelter would be exposed only to 25*r* — the difference between being dead and not even sick.

In areas of greater intensity where the unprotected exposure would reach 7000-8000*r*, the exposure of those in the shelter would range from 70-80*r*, which, although undesirable, would not be a grave risk for patients and would fall within the permitted limits for operational personnel.

Summary

An attempt has been made to provide health authorities with an idea of the gamma radiation hazard that they might expect in hospitals and other health establishments.

The importance of knowing the shielding capability of establishments beforehand is emphasized. A description of the structural characteristics that influence shielding capacity is given. Two examples of hospital buildings on which a shielding analysis has been conducted are used as illustrations.

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2. *An Engineer Looks at Fallout.* Emergency Measures Organization, Ottawa.

3. Peck, G. W. "Fallout. What a Hospital Can Do About It," *Canadian Hospital,* (June 1962).

The author wishes to thank Mr. George Peck, Hospital Design Division, Department of National Health and Welfare for the analysis of the Almonte and Sackville Hospitals.

Many nutrition and medical authorities have been asked to comment on the best-selling diet book "Calories Don't Count." Their remarks and warnings have been unanimous in branding this publication as "nutrition nonsense and food quackery." In recent months some 1600 copies of the book have been impounded by the Food and Drug Administration in the United States, charging "false and misleading promotion" in two misbranding cases involving safflower oil preparations (the capsules recommended as dietary supplements in the book). Dr. William B. Bradley, Scientific Director, American Institute of Baking, Chicago, Illinois, states that the diet recommended in the book is strictly a therapeutic diet, capable in itself of creating imbalances which may be harmful. Such a diet, he believes, should be used only under the supervision of a physician who is in a position to protect the user against severe acidosis which may jeopardize the patient's health.

—*Bakery Foods Foundation Reports,* Vol. 4, No. 1.

* * *

Glaucoma is now recognized as an important public health problem in Canada. It is more common than diabetes in the over-40 section of the population. Glaucoma destroys the seeing parts of the eye as a result of the increased pressure within the eye. The disease can be checked if diagnosis is made early enough.

* * *

Man errs so long as he strives — GOETHE

Radiation Hazards Control

WILMA G. STEWART, M.D.

Radiation hazards control measures, if properly conceived in advance planning and properly applied during the early days after a nuclear attack, can reduce the toll of radiation casualties.

The Rand civil defence report (1957), predicting the consequences of an extensive nuclear attack on the United States, estimated that the total casualties from all causes might be five million with adequate control of radiation exposure but as high as 90 million if satisfactory control measures were not provided.*

Radiation protection is a command function. The military or civil defence commander is responsible for control of radiation hazards. The responsibility for advice on probable effects of radiation exposure is the province of the professional medical advisor.

Basic assumptions have been adopted in the light of imprecise data on the effects of radiation in man. It is the intention of this article to explain certain of these assumptions and the philosophy which applies to the responsibility of the medical profession in providing information on which operational or command decision will be based.

The Harmful Rays

Radiant energies are released by atomic weapons. The two main components of biological significance are:

1. The gamma ray that penetrates deeply and in humans causes general effects, i.e. radiation sickness;

2. the beta ray that does not penetrate. It produces specific effects such as skin burns from surface contact, and lesions that may result from internal contamination.

The unit of radiation dose which is used by the Canadian Services and Emergency Measures Organization (E.M.O.) is the roentgen *(r)*. Radiation measuring equipment procured by E.M.O. is so calibrated. The accuracy of this unit, and the use of a single unit, is quite acceptable in developing practical guides and planning documents. The term *r* for roentgen is used in this paper as synonymous with the more scientific terms; *rad* (absorbed dose) and *rem* (RBE dose). The numerical values for all can be considered equivalent in view of all the other uncertainties involved.

National Survival in a Nuclear War

Under conditions of national survival or wartime operations we are chiefly concerned with the effects of acute doses of radiation acquired within a brief period of a few days. The operational significance of radiation exposure is in the production of ineffectiveness which is important from two aspects: Reduction of the effective rescue or combat force; the number of casualties or medical care load.

Radiation exposure in such an emergency will be partly accidental (no

* Analogous calculations have been made for Canada.

DEPARTMENT OF NURSING
OTTAWA GENERAL HOSPITAL

Table 1

Acute Effects of Whole Body Penetrating Ionizing Radiations on Human Beings (after Alpen)

Dose in 1 week	Effect
0-150 r	No acute effects — some long term hazard.
150-250 r	Nausea and vomiting within 24 hours, minimal incapacitation after 2 days.
250-350 r	Nausea and vomiting in under 4 hours. Some mortality will occur in 2-4 weeks. Symptom-free period of 48 hours to 2 weeks.
350-600 r	Nausea and vomiting in under 2 hours. Mortality certain in 2-4 weeks. Incapacitation prolonged.
600 r and more	Nausea and vomiting almost immediately. Mortality in 1 week.

control) and partly under a measure of control that must be provided for in advance planning. This will be an important factor in guiding operational decision, e.g. in entry and rescue, reoccupation, or transfer of evacuees to uncontaminated or safer environments. Exposure to the initial radiation of weapon detonation and fallout in transit is uncontrollable. Those so exposed would be fatalities due to blast and heat effects. We are concerned with the two types of radiation resulting from deposited fallout; *penetrating gamma radiation*, and *beta radiation as a contact hazard*.

Control of External Gamma Radiation Hazard

Current guides regarding acceptable exposure levels to radiation are based on rather imprecise knowledge. They are subject to revision as new facts become available. Our aim is to establish levels of radiation exposure and state the probable early effects on individuals or groups who might represent a rescue force, a military unit, or a section of the population. According to established military principles, the decision to place any individual or group in a situation where there is risk of radiation (or any other hazard), or to accept the probability that a certain number of the forces available will become ineffective, i.e. as radiation casualties, must rest with the commander. Only he can rate the risk involved with the importance of the objective. In survival operations this decision-making applies not only to rescue personnel but also to the total population. The commander needs a guide that describes the consequences of exposure to radiation dosages.

One of the recommendations of the (U.S.) National Committee on Radiation Protection (NCRP) in respect to exposure to radiation in an emergency should be noted:

> In war emergencies the objectives are, first, the fewest deaths; second, the fewest requiring medical care; third, the smallest amount of genetic injury; and fourth, the lowest probability of late somatic effects.

Report No. 29 of NCRP[1] states the four elements that are employed in the process of command decision-making in an emergency as follows:

> 1. An input of information;
> 2. a system for predicting the outcome of any action that may be recommended;
> 3. a system for assigning values to all such outcomes;
> 4. a system of criteria for selecting the appropriate action. The second and third items designate the areas in which guidance on radiation effects in man is essential.

Though experts differ in their opinions on the acute effects of ionizing radiation in man from certain doses, all agree that the range 200-1000 *r* covers slight symptoms to death within a few weeks. There is similar agreement that, up to 150 *r*, no obvious illness will be noted. The dose-effect table, that is accepted by EHS, is included since it is less presumptuous than earlier published tables (Table 1).[2]

Caution in the use of this or other dose-effect predictions for planning or operations is offered by the following provisos:

> 1. Prediction of dose-effect is only as accurate as the estimate of the dose received. The prediction of dose may have

an uncertainty ranging from ± 25 per cent to ± 50 per cent. These uncertainties are mainly due to inaccuracies in radiation measurement instruments under field conditions.

2. There are a number of factors upon which the degree of radiation injury in any one individual depends:

a. Dose received.

b. Whether the exposure was partial, or whole body, multidirectional or unilateral.

c. Period over which the dose was accumulated, i.e. dose-rate. A given dose received in a short time will be more injurious than the same dose protracted at a lower dose-rate.

d. History of previous radiation exposure.

e. Resistance or susceptibility of the individual to radiation injury.

In formulating radiation exposure guides, EHS and the Canadian Armed Forces have chosen a minimum number of exposure levels to be stated in figures. They have enunciated certain principles to be considered in conjunction with these figures. The probable effects beyond these levels are described in ranges of dosage as in Table 1.

"Rules and Standards for Maintaining Operational Efficiency in the Face of Radiation Exposure" are as follows:[3]

1. a. No one shall be deliberately exposed to irradiation without good reason.

b. The levels of exposure must be kept as low as may be compatible with the success of a useful defensive operation.

c. Responsibility for decision on the need for radiation exposure is that of the commander or coordinator.

d. Responsibility for measurement and calculation of radiation exposures belongs to the technologist (Radiation Monitoring Services).

e. Responsibility for advice on probable effects of exposures is the province of the professional medical advisor.

2. Persons who are exposed to not more than

a. 100 *r* whole body radiation in a six week period or

b. 200 *r* whole body radiation in a period in excess of six weeks may be expected to escape without noticeable loss of operational efficiency.

3. As exposure levels increase, the probability of occurrence of operational inefficiency increases. Just above the upper limits of the ranges quoted, some mild reactions can be expected.

4. Where exposures greatly exceed 200 *r* for the emergency period, those so exposed must be regarded as radiologically expended; that is, additional exposures at operational levels will probably be followed later by appreciable damage to health.

5. These rules are based on the need for preserving operational efficiency of a limited number of persons.

6. They are very high levels at best and those so exposed undergo some risk of becoming late war casualties from various causes and of suffering shortening of lifespan.

7. The general public should not be allowed deliberately to accept such high exposure levels. For such groups, 25 *r* during the emergency period should probably be the upward limit for planning, and for operations, if feasible.

The dose of 25 *r* quoted for the general public may appear to be somewhat idealistic. It is recognized that it will be exceeded under certain radiation conditions. Careful study of probable fallout conditions offers evidence that it is a reasonable objective for a significant fraction of the population.

The concept of a recovery factor warrants mention. It is accepted that somatic radiation injury is made up of a reparable and of an irreparable fraction. Knowledge of this process in man is incomplete. Any conclusions regarding the amount of irreparable injury and the rate of recovery of the reparable fraction has been based on experimental evidence in animals.

Control of the Contact Hazard

Beta radiation from fallout material deposited on skin or clothing is the source of this hazard. The most serious injury that can result is skin burns. From a radiation protection point of view, the beta hazard should be considered relative to the external gamma hazard. The beta hazard may cause injury but will seldom be lethal. Gamma radiation is the controlling hazard during early days in a fallout field.

Measurement of beta contamination under field conditions is impractical because of technical difficulties; therefore the condition will always be presumed to coexist with gamma hazard

from fallout and appropriate control measures should be instituted.

Of a number of factors which govern the probability of skin injury from beta contamination the closeness and duration of contact of the fallout particles on the skin are the most important. This fact points the way to simple effective protective measures that can be easily explained to permit personal protective action:

Immediate or earliest action to wash exposed skin and change clothing, with controlled disposal of wash water and contaminated clothing, is recommended. Various directives and hand books[2] offer detailed instructions beyond the scope of this paper. Protective clothing of simple design and ordinary materials for survival operations personnel will be provided. Control of evacuees and others in and through contaminated areas, is also important to reduce the possibility of beta injuries and to minimize the requirements for decontamination facilities.

Control of the Internal Hazard

This hazard results from radioactive material (a mixture of radioisotopes contained in fallout) that may be taken into the body by ingestion or inhalation. Internal contamination by this material will be less important in the early emergency period after a nuclear attack than the external exposure to gamma radiation. Precautions to limit the amount of radioactive material taken in should be followed since serious late effects may result.

The main route of entry is by *ingestion*. Control is a matter of assessing the degree of contamination of food and water. Ingested radioisotopes may be in sufficient concentration to cause injury of the intestinal tract. If soluble, they will be absorbed to become fixed in certain body tissues and produce damage by continuous irradiation at that site over a prolonged period. The isotopes that are the main culprits are the bone seekers: Strontium 89, Strontium 90, Barium 140, and Lanthanum 140; the thyroid seeker, Iodine 131; and Caesium 137 which gives rise to general irradiation in the body including the gonads.

Standards have been set, below which food or water may be considered safe for consumption during the emergency period. A method for surveying water and food, applicable in the field and valid for the first 30 days after contamination, has been adopted by EHS.[2] Until adequate survey procedures can be set up, i.e. during the first few days post-attack, only food stocks that have been in protected storage, or canned and packaged food should be used. The latter supplies should be cleaned on the outside of the container before opening. Water from covered or deep wells would be the safest source during this period.

Iodine 131 in milk is a hazard to infants rather than to adults. For this reason, emergency supplies include stocks of canned and powdered milk.

The internal hazard can be controlled by advance planning, stockpiling of food stuffs, and by sensible precautions during the early emergency period. EHS must also be alert to the possible hazard to health of contaminated food and water consumed over longer periods during the late emergency and rehabilitation period. Radiochemical analysis would be required to accurately assess the safety of food and water at later times.

Conclusion

Control measures can effectively reduce casualties from radiation exposure and maintain the efficiency of survival operations personnel. Radiation protection is a responsibility of the commander. Advice on probable effects of radiation exposure to guide command decision is a medical responsibility.

When the problem is national survival, it is a question of how much radiation people can take. Safe or permissible exposure levels would impose impossible restrictions on the conduct of field operations.

The "Rules and Standards for Maintaining Operational Efficiency in the Face of Radiation Exposure," recommended by EHS, are well conceived. They offer the best advice available in the light of present knowledge of radiation effects in humans.

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*Analagous calculations have been made for Canada.

Effect of Ionizing Radiation on Immunity

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Evidence from experimental work in animals and observations on man following exposure show that ionizing radiation usually has a deleterious effect on the immunity mechanism.

Large doses of ionizing radiation induce severe "radiation sickness" in man and animals which is manifested by a typical complex of symptoms. Changes in the immunobiological reactions play an important part in producing this state of affairs. Small doses may have no outward effect, the only manifestation being on the hematopoietic system.

General Radiation Effects*

The effects of radiation depend not only on the total dose but on the rate of absorption and on the region of the body exposed. 1,000 rems (see glossary) in a single dose would usually be fatal if the whole body were exposed. There would, however, be no noticeable external effects in the majority of persons if 1,000 rems were applied more or less evenly over a period of 30 years. Different parts of the body have different sensitivities and some individuals are more sensi-

* Samuel Glasstone, ed., *The Effects of Nuclear Weapons*, U.S. Atomic Energy Commission, 1962, p. 592.

Characteristics of Acute Whole Body Radiation Injury to Human Beings.

25 to 100 rems — no disabling sickness, blood changes occur, drop in lymphocytes and granulocytes.

100 to 200 rems — slight or no illness, some discomfort and fatigue, perhaps nausea and vomiting, and more marked blood changes

200 to 1,000 rems — survival good at lower range, poor at upper range, nausea, vomiting, hemorrhages, susceptibility to infection, marked depression of blood elements, immunity markedly disturbed

Over 1,000 rems — survival improbable, 5,000 rems or over prompt changes in central nervous system, 1,000 to 5,000 rems affect gastrointestinal tract and hematopoietic system severely.

tive than others. The most radiosensitive parts of the body include the lymphoid tissue, bone marrow, spleen, organs of reproduction and the gastrointestinal tract.

Immunity Mechanism

Immunity is a very complex mechanism consisting of humoral and cellular components. The exact site of antibody formation has been the subject of extensive investigation. Coons[1] has presented evidence that antibody is present in groups of plasma cells in the red pulp of the spleen, medullary areas of lymph nodes, submucosa of ileum and portal connective tissue of the liver. He found small amounts of antibody in the cells of the lymphoid follicles of the spleen and lymph nodes and concludes that the lymphocytes may make a minor contribution. From this and other work[2] it would seem that the plasma cells are mainly responsible for the synthesis of antibody and the large lymphocyte is the chief ancestor of plasmablasts and plasma cells. As well as humoral antibody there are various cells of the blood such as the macrophages that play a very important part in controlling infection. The cells of fixed tissue also possess the property of resisting invasion by microorganisms. Thus the cells which play such an important part in the immune mechanism are among the most sensitive tissues of the body when exposed to ionizing radiation.

Change in Microflora

It has been observed[3] experimentally in animals and clinically in man that following radiation injuries the normal balance between the microflora of the gastrointestinal and respiratory tracts and the skin is upset. This plays an important role in radiation sickness. In a massive radiation dose (over 1,000 rems) that results in death this imbalance is not the cause of death. In sublethal doses the bacterial inhabitants of the gastrointestinal tract invade the tissues and organs and set up a bacteremia which may lead to the death of the individual. The same phenomenon has been observed in the respiratory tract and the skin. Basically, the damage to the natural body defences leads to:

1. Increased permeability of the mucosa of the intestines and respiratory tract to microorganisms;
2. a decrease in phagocytosis because of fewer cells;
3. decreased bactericidal efficiency of the blood serum and of skin;
4. a disturbance in the ability to produce antibodies.

All of these reactions have been well documented in animals[3,4,5] but the observations in man are not extensive. The inhabitants of Hiroshima, following the detonation of the atomic bomb, showed clinical and pathological evidence[6] of this effect by such manifestations as angina, pneumonia, enteritis, colitis, sepsis and other infectious complications. The dose to which the victims were exposed at Hiroshima is not known with any great accuracy. Confirmatory bacteriological examination by means of blood cultures was not possible under the prevailing conditions.

A fully documented follow-up of the people of Rongelap in the Marshall Island[7,8] is one of the few records of the early and long-term findings in man following total body irradiation where the dosage was fairly accurately calculated. In the Rongelap group, 64 persons were exposed to 175 *r* and 18 persons to 69 r. The exposure of the group receiving 175 r was moderately severe, probably within 50 to 100 r of the level where some fatalities would have resulted. It has been estimated[7] that the minimal lethal dose for man exposed in a fission product field is approximately 225 r measured in air. Apart from nausea and vomiting the most consistent finding was the effect on the white blood cells. The lymphocyte count, which was depressed early, remained depressed until the 10th week and did not return to normal, in some cases, for many months or years later. The granulocytes and platelet count fell early and, like the lymphocytes, remained down for long periods of time. In spite of the depression of hematopoiesis in the Rongelap people, there was no sign of radiation illness related to such depression. No deaths occurred that could be related to their radiation exposure. Complement fixation studies for parainfluenza 1, 2 and 3, respiratory syn-

cytium, psittacosis and Q fever, showed antibodies to these viruses but none to Asian influenza. The antibody titres appeared to be somewhat lower in the exposed people. Thus, a fairly large dose of ionizing radiation, while showing striking effects on the hematopoietic system, did not lead to any apparent disturbance in the normal resistance of the people exposed.

The observations in animals indicate that when sublethal doses of irradiation are employed:

1. The organism becomes more susceptible to infection by the automicroflora of the intestine, respiratory tract and skin;
2. there is decreased resistance to infectious agents during radiation sickness, especially pronounced during the acute phase;
3. complications due to infection can be a direct cause of death in radiation sickness.

Effect of Ionizing Radiation

Investigations on the effect of irradiation on the production of active immunity have been carried out in animals. Non-living antigens such as toxoids or red blood cells have usually been employed. There is an advantage in using non-living antigens in contrast to infection with living microorganisms in that invasiveness and continuing immunization from antigen multiplication is ruled out. This does not mean that investigation with infection by living organisms is not important. The time of exposure to the irradiation and to the giving of the antigen is important. It has been conclusively shown[4] that the effect is greatest when the exposure is made shortly before the injection of the antigen. This observation is based on multiple experiments on animals using varying doses of irradiation and different antigens. The findings in most instances have been in agreement. In one experiment it was found that a short-term exposure of 400 rads to mice prior to receiving fluid tetanus toxoid repressed the primary antitoxin response completely for the first 20 days. This was followed by a minimal appearance of antitoxin during the subsequent period of observation.[9] A much larger dose of radiation is required to affect the secondary response to an antigen. Expressed in another way, the primary response is about three times more radiosensitive than the secondary response. The general conclusion may be drawn from the experimental work in animals that:

> Doses of ionizing radiation just sublethal to the host inhibit the production of antibodies when administered at the beginning of immunization. The effect is not as marked in the case of the production of secondary immunity.

If the results in animals can be applied to humans, then active immunization should be carried out well in advance of exposure to ionizing radiation.

Enhancement of Immunity

In considering the deleterious effect of irradiation it should be kept in mind that relatively large doses and total body exposure are employed. Favorable results[4] in properly controlled experiments in animals from locally applied x-rays have been reported for a wide variety of microorganisms. A variety of therapeutic effects in man have been reported after the irradiation of local areas infected by many different types of bacteria. The dermatologist and radiologist will attest to the beneficial effects of small doses of irradiation applied locally for the control of infection. Multiple doses with a wide variation in the intervals and length of treatment are frequently advocated. The exact explanation of this enhancing effect is not clear at present.

Passive Immunity

Passive immunity is a subject of practical importance since it may be necessary to give antisera to an irradiated individual. While extensive investigation has been carried out on the effect of irradiation on the production of active immunity, very little has been done on the effect on passive immunity. In the limited experimental findings in animals[3] it has been observed that irradiation decreases the efficiency of antitoxic sera. However, it was found that an increased dose of the serum is capable of compensating for the harmful effect of radiation injury.

Vaccine Prophylaxis in Man

The use of live vaccines, as is customary in the U.S.S.R., raises the problem associated with the post-irra-

diation use of such vaccine. The findings in animals indicate that large but sublethal doses of irradiation reduce antibody formation. It is possible that the use of live attenuated vaccines in the irradiated individual might lead to untoward reactions, even development of the disease.

There is little reported work on this problem. In mice, irradiated immediately before or after vaccination with live attenuated tularemia vaccine, there was a marked increase in the vaccine process followed by 100% mortality.[10] In hospital personnel who were exposed to x-ray machines and had been vaccinated with live tularemia vaccine it was found that those who had the most continuous exposure (i.e., technicians) had the lowest antibody titres.

Some investigators believe in the premise that regenerative processes in the bone marrow and spleen may begin within 5 to 10 days after a large dose of irradiation, and that active immunization can be successfully imposed despite the loss of the immune mechanism.

Infection with Bacteria, Rickettsiae, Viruses

The pioneers in radiobiology demonstrated the deleterious effect in animals of ionizing radiations in reducing resistance to pathogenic microorganisms. More recent work[3,5] has confirmed and extended these findings. The infectious agents studied include *Cl. Perfringens, Cl. tetani, Staphylococcus aureus, hemolytic Streptococcus, C. diphtheriae,* and others. In these experiments the effects were not immediate but they found there was a latent period of three days following irradiation in which no untoward effect was noted. A significant recovery of the capacity of the survivors to combat the infectious agents took place about the third week following irradiation. This period, known as the "period of minimum resistance," varies in different animals.

There have been no comparable observations made in man but it is reasonable to suppose a similar effect would be noted following irradiation. The need to begin treatment as early as possible in casualties of atomic bomb explosions should be stressed. Furthermore, treatment should be continued throughout the "period of minimum resistance" until the immune mechanism has recovered sufficiently to assure survival of the individual.

Prolonged Irradiation at Low Levels[11]

This is generally less detrimental than a similar dose delivered acutely. This difference is thought to be due to the concurrent recovery processes. Prolonged exposure of rabbits to a low rate of irradiation (total of 1400 r) causes no significant reduction in antibody titre and no depression of the peak titre. By inference, the immunity mechanism of individuals exposed to the chronic effects of low doses of irradiation in the event of an atomic disaster would not be adversely affected.

Summary

1. Ionizing radiation approaching lethal amounts when administered to the entire body *decreases host immunity* to normal inhabitants of the gastrointestinal tract, the skin, and the respiratory system, to specific infections and lowers antibody formation, especially to a primary stimulation.
2. The treatment of individuals showing evidence of infection following irradiation should be continued long enough for the process of recovery of the immune mechanism to take place. This may be a matter of weeks.
3. Active immunization should be carried out well in advance of exposure to ionizing radiation.
4. Passive immunity is believed to be adversely affected but this may be overcome by giving larger doses of antisera.
5. Small amounts of x-rays administered locally enhance antibody formation and the resistance of experimental animals to certain infections. This conclusion has been reached in a wide range of infections in man but has not been as well controlled as in animals.

Glossary[12]

rem — Abbreviation for "roentgen equivalent man" (or "mammal"). The unit of

dose of ionizing radiation weighted for relative biological effectiveness.

rad — The unit of absorbed dose of radiation; one rad is equal to 100 ergs per gram. Submultiple: millirad (mrad) = 10^{-3} rad.

r — Abbreviation for roentgen. The unit of exposure dose of X- or gamma radiation. Such that the associated corpuscular emission per 0.001293 g. of air (equivalent to 1 $cm.^3$ of dry air at 0° C. and 760 mm. Hg) produces, in air, ions carrying one electrostatic unit of electricity of either sign.

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The EHS Check List

	Quantity Check
Sterile Dressing Pads (8" x 8")	4 pads
Sterile Gauze Pads (3" x 3")	12 pads
Triangular Bandages	6 bandages
Gauze Bandages (2" x 10 yds)	3 rolls
Sterile Absorbent Cotton (1 oz.)	1 box
Individual Adhesive Dressing Strips (¾" x 3")	12 strips
Adhesive Tape	1 roll
Safety Pins (1½")	12 pins
Splints, Plastic or Wood (3⅓" x 15")	6 splints
Small Scissors	1 pair
Wooden Tongue Blades	12 blades
Folding Paper Drinking Cups	25 cups
Toilet Soap	1 bar
Paper Tissues	1 package
Acetylsalicylic Acid (5 gr.)	12 tablets
Sodium Chloride (10 gr.)	25 tablets
Sodium Bicarbonate (5 gr.)	100 tablets
Water Purification Tablets	3 ounces
Antiseptic Solution (Benzalkonium Chloride 1/1000)	1 ounce
Eye Drops: Castor Oil	25 tablets

Provide 3 months' supply of any special medicines for members of the family who require continuous treatment.

Cold Injury in Civil Disaster

W. ZINGG, M.D. *and* J. A. HILDES, M.D.

In the event of a large scale civilian disaster in the winter, the survival of persons suffering from cold injury would depend upon organized rescue and treatment operations.

The possibility of a large scale civilian disaster occurring in any Canadian city in winter is generally viewed with pessimism because of the lethal effects of prolonged exposure to severe cold. There are records, however, of individuals, often injured, who survived many hours in extreme cold; thus it is probable that many would not succumb to cold injury. Organized rescue operations would begin four to six hours after any disaster.

Although this matter was discussed by Webster and Bigelow[1], in the special Civil Defence issue of the *Canadian Medical Association Journal* 10 years ago, plans for the management of cold injury patients seem to have received scant attention. Since we consider it an important aspect of winter time disaster in our country it seems timely to review the subject again.

It is important to establish the distinction between local and systemic cold injuries since they differ in diagnosis, management and prognosis. Although both may be expected to occur together frequently, generalized hypothermia is the far greater immediate threat to life. Therefore, treatment of hypothermia should receive priority over frostbite.

The discussion of the management of mass casualties is introduced by some comments on the risk of cold injury and on prophylactic measures.

The rescue operation is considered at three levels :

1. The first aid given by the rescue columns.

2. The advanced treatment centre where casualties are sorted out for further evacuation and given emergency treatment.

3. The definitive medical establishment which may be an emergency hospital or an existing hospital.

Other injuries such as trauma, burns and radiation, will undoubtedly complicate the picture of cold injury.

Observations on Hypothermia

The general lines of the clinical syndrome associated with deepening hypothermia run parallel in animals and man. There is a progressive deterioration in central nervous system function with ataxia, dysarthria, drowsiness, and eventually coma. Respiratory and cardiovascular functions become more feeble; respiration usually ceases before the heart stops. Cardiac arrest may occur as simple asystole or be preceded by ventricular fibrillation.

Although observations were reported on cases of accidental hypothermia as early as 1875 by Reinke[2] (who recorded one man who recovered from a rectal temperature of 24°C.), pioneer work in human hypothermia was carried out by Temple Fay and his colleagues in Philadelphia in 1940[3,4]. In their studies on the effects of prolonged hypothermia in the treatment of cancer patients, detailed observations were made on the temperature at which various body functions were lost. Shivering, which is so prominent a feature of body cooling, is suppressed below a temperature of 30°C. It is emphasized that below this critical temperature the normal body mechanism for self-rewarming does not operate. Further cooling may be expected to proceed at approximately the same rate as a dead body of equal size and temperature. Below the temperature range of shivering, rewarming requires the application of external heat.

At 30°C. the patients were found to be comatose but tendon and pupillary light reflexes persisted. In cats, the tendon reflexes persisted to a body temperature of 17°C. This is close to the lethal temperature for this species.[5] Fay's patients were often debilitated and many died. At autopsy the part played by cold and the mechanism of the lethal effects of cold could not be established. Serum amylase levels were

often high and acute pancreatitis was diagnosed in about 10 per cent of patients cooled.[6,7] This has also been mentioned as a complication of accidental hypothermia.[8]

Hypothermia as a Therapeutic Measure

The technique as a therapeutic measure was abandoned and lay dormant until stimulated by the demands of cardiac surgery. Prolonged hypothermia is used with good effect in the management of severe head injuries. However, the clinical picture of uncomplicated hypothermia is obscured by the use of drugs and by injury. The same considerations apply to many cases of accidental hypothermia which are complicated by intoxication, traumatic injury or severe frostbite. Currently, short-term, induced, therapeutic hypothermia is used mainly in cardiovascular surgery. Various techniques of cooling have been devised, always in association with anesthesia and the use of drugs to suppress shivering, until a stage of hypothermia is reached where these agents are no longer necessary.

Death in hypothermia is usually attributed to cardiac arrest. The difficulty in deciding when death has occurred is well illustrated by the studies of Andjus[10] and others in which small animals were revived intact after respiration and heart beat had been stopped for an hour and an appreciable percentage of the total body water had been converted to ice. Humans under induced hypothermia tolerate short periods of circulatory and respiratory arrest. Under these circumstances of suspended animation death must be defined as failure to revive on rewarming. This poses difficulties in the diagnosis of death in cases of accidental hypothermia. For practical purposes at the present time, we must accept (with some reservations) the findings of Molnar,[11] who reviewed ship-wrecked cases in cold water during World War II, that 27° C. is the lethal temperature for man.

Cases of accidental hypothermia who survived have been reported with lower rectal temperatures. Laufman[12] in 1951 reported on a woman in Chicago whose rectal temperature was estimated to be lower than 18° C. This is the lowest temperature followed by survival recorded in humans. With the help of extracorporeal circulation, with and without oxygenator, patients and experimental animals have been taken down to even lower temperatures with subsequent resuscitation and no apparent ill effects. The mechanism of the apparent protective effects of anesthetics, alcohol and other drugs is still somewhat obscure. It may have to do with suppression of shivering and consequent changes in acid-base balance.

Rewarming Technique

Obviously an important question is what is the best and safest method of rewarming. In deep hypothermia induced for open cardiac surgery, rewarming is usually undertaken before the end of the operation by the circulation of warm fluid through the heat exchanger in the extracorporeal circulation. Electrical defibrillation may be necessary as the body is warmed from within. Artificial ventilation by intermittent positive pressure is also used until the patient's own respiratory control takes over adequately. Following exposure, rewarming the periphery while the heart and lungs are still cool may further lower the central temperature by the circulation of cold blood from the periphery.[13] This may cause an imbalance between blood oxygenation and circulation and the metabolic demands of the peripheral tissues, the extreme case of which is warm extremities with cardiac and respiratory arrest.

Andjus and Smith revived small animals by instituting artificial ventilation and rewarming the heart through the chest wall. The use of body diathermy and intermittent positive pressure ventilation has been recommended in man. The practical aspects of rapid rewarming by immersion in warm water as opposed to slow rewarming of the chest by application of external heat in accidental hypothermia has not yet been finally decided. It is generally agreed that artificial ventilation in recovery from deep hypothermia is essential. This is in contradistinction to local cold injury or frostbite where rapid rewarming of the part from the frozen state is to be preferred.

Cold Injury and Prophylaxis

Outside air temperatures during the winter fall to below freezing in all Canadian centres of population. Under our present circumstances of urban living, cold exposure is not a problem to individuals and we have forgotten how to deal with it. If power, transport and heating services were suddenly not available we would not be able to cope with the weather without guidance, instruction and help. To minimize the number of cold injury casualties in a winter disaster, plans should be made for the provision of cold weather clothing and blankets. These plans should include instruction on how to minimize exposure.

The standard fallout shelters offer considerable protection from the weather. Based on studies by the Building Research Division of National Research Council on temperature conditions in basement shelters in unheated houses in winter and on weather data, it is estimated that two weeks after the shut-off of domestic heat an occupied but otherwise unheated shelter would still maintain a temperature above freezing, even in Saskatoon.[14] People in an intact shelter would be better off to remain there as opposed to attempting to leave the area on foot without adequate cold weather clothing.

The thermal shelter afforded by piles of rubble under which individuals may be trapped, is much more difficult to assess. It depends on the depth and characteristics of the rubble and the size of the air spaces. Injured or trapped persons exposed to the full force of the weather and inadequately clothed would, of course, be most liable to cold injury. The fact must not be lost sight of that non-seriously injured but immobilized casualties may become cold injured during evacuation if they are not given a high priority for protective clothing and evacuation to some form of heated shelter.[15]

Management of Mass Casualties

First Aid

The major functions of the first aid teams are rescue and the transport of the injured to advanced treatment centres. With regard to general cold injury at this level, the first task is recognition. To distinguish between a state of deep hypothermia and death may be difficult. In deep hypothermia, breathing may be so shallow and infrequent as to go unnoticed. The heart beat and blood pressure may be so weak as to make peripheral pulsation undetectable. In this state, particularly upon exposure to very cold air, the skin may be cool, pale and subject to frostbite, particularly in the extremities. The time interval before rescue is an important consideration. Internal body temperature may not be particularly useful for the first several hours since a dead body would probably be cooling at almost the same rate as a hypothermic individual once he is past the stage of shivering.[16] Observations on animals indicate that the pupillary light reflex and the tendon reflexes remain active until shortly before death. These, if present, would be valuable indicators of life. The chances for survival in a deep hypothermia are sufficiently great to warrant the rescue of anyone showing signs of life. At this stage of rescue rewarming should probably not be attempted. However, the patient must be protected by insulation against further cooling.

Since consciousness is interfered with at fairly high levels in hypothermia, the question of whether the patient should be walking or a lying case does not pose any problem. Persons with mild, generalized hypothermia, who are alert and coordinated enough to walk will not come to harm on walking. They may require additional protective clothing and should be encouraged to proceed to the next treatment centre on their own. If this is located at some distance they should be accompanied. Unconscious or ataxic patients must, of course, be carried.

Local cold injury consists of two types :

Non-freezing cold injury, sometimes called "immersion foot" or "trench foot", and *frostbite*. The former may occur in elderly people confined in an environment just above freezing. The affected part will be edematous, discoloured and painful. Although long-term disability might result from this type of cold injury, it does not constitute an immediate threat to life. When

it involves both lower limbs, walking might be difficult or impossible. In frostbite, the limb is pale, hard and very cold. Its clinical importance depends on the extent and location. Persons with extensive cold injury of the lower extremities should be considered as stretcher cases. Frostbite of the nose or ears is a minor injury.

The rescue team will probably not be in a position to effect deliberate rewarming since this procedure requires long-term care and protection to the parts. The injured limb should have all restrictive clothing and foot gear removed or loosened, and must be protected against further cooling by insulation and warm blankets. Smoking should be discouraged.

It is important to record, as early as possible, the extent of initial cold injury, whether it be local or systemic, since the use of drugs in this situation should be approached cautiously. The absorption of drugs administered subcutaneously or intramuscularly will be delayed in hypothermia and their action consequently prolonged. Drugs which suppress shivering may in themselves induce hypothermia. The effects of some drugs may quantitatively at least be very different in hypothermia than at normal temperature.[17] In a conscious patient there may be considerable pain as the frozen extremities are warmed. This would necessitate the use of analgesic drugs.

Advanced Treatment Centre

This centre should be in a building or shelter, with a source of heat and food, with nursing services under the charge of at least one doctor. The doctor will be faced with the decision regarding rewarming at this centre or evacuation to hospital. The staff will have the facilities to note and record vital signs. The depth of hypothermia is best gauged by the use of low-reading rectal thermometers. The hypotensive effect of hypothermia must be recognized to distinguish it from shock. Overloading the circulation with plasma expanders to raise the blood pressure in hypothermia may be dangerous. Probably the best course is not to attempt rapid rewarming but to incur the risks attendant on transfer to a hospital. The chances of survival from hypothermia warrant such transfer to a definitive treatment unit with a high priority over patients with extensive trauma or large area burns where survival is doubtful. The treatment of pain and shock from concomitant injury must be considered cautiously with due regard to the enhanced effect of drugs in hypothermia and to the contribution which some drugs may make towards further lowering the body temperature by suppression of shivering.

In the treatment of frostbite at the advanced treatment centre, rewarming is only the first step. Rapid rewarming of the part in water at 40° C. should be instituted as soon as the constricting clothing has been removed. The part should then be wrapped in sterile, loose dressings to protect it from infection, trauma and from further cooling if the patient is to be transported back to hospital. Antibiotics and analgesic drugs may be given at the advanced treatment centre, but they may be poorly absorbed from a subcutaneous injection in the presence of hypothermia.

Hospital Treatment

When they reach hospital, some hypothermic patients may be well on their way to self-warming as evidenced by active shivering. Patients with body temperatures close to the danger level will be unable to rewarm without the application of extraneous heat. The principles of the management of hypothermia are derived chiefly from surgical experience with induced hypothermia, from the sporadic cases of accidental hypothermia, and from the knowledge gained from animals. The chief cause of death is cardiac irregularity, or standstill which occurs with increasing frequency below a body temperature of 28° C. Therefore, attempts should be made to bring the patient out of his dangerous level of body temperature as quickly as possible. This may be done by immersion in warm water (38-40° C.), by the use of special heating blankets, or any other means that can be improvised. Once the patient is shivering and conscious, external rewarming is no longer necessary. There is some question concerning the undesirable effects of prolonged shivering

on acid-base balance and the subsequent development of so-called rewarming shock. Supportive measures which may be available in a hospital are artificial ventilation with air or oxygen during rewarming, the treatment of shock by plasma expanders, and the use of EKG controlled cardiac pace-makers and defibrillators.

The indications for actively rewarming patients suffering from accidental hypothermia are problematic and controversial. Since at temperatures below 30° C. cardiac irregularities may occur, it appears advisable to raise the temperature to 30-32° C. without delay. At temperatures higher than 32°, vigorous attempts to increase the body temperature rapidly should not be undertaken. In the experience of Duguid,[18] who reported on several cases of accidental hypothermia in elderly people, all patients died who were rewarmed actively. It is not quite clear why death occurs under these circumstances.[19] The situation is quite different from induced hypothermia in the operating room. Here, rapid rewarming following a period of rapid cooling and a period of induced hypothermia under anesthesia is common practice. During exposure and accidental hypothermia cooling takes place much more slowly. It may be assumed that a number of changes occur in the internal environment of the body. Accordingly, the treatment of hypothermia produced by cooling slowly over many hours may perhaps be most safely achieved by *rewarming slowly* over many hours. The patients have to be carefully supervised during the rewarming procedure and, if possible, electrocardiograms should be taken. The blood acid-base balance and electrolytes should be checked at intervals.

The question of prognosis in generalized hypothermia is of practical importance in determining when such patients may be removed from the hospital. It is generally considered that patients who have been severely hypothermic are seriously ill with considerable instability in thermoregulation and vasomotor control for two or three days. It is probably safe to discharge a hypothermia patient from hospital after he has remained normothermic with reasonable cardiovascular function for 48 hours after rewarming.

Grading frostbite into degrees of injury is not of practical importance. The part, if still frozen, should be rapidly rewarmed to body temperature in warm water not over 44°C. Sterile, dry, loose, dressings should be applied, succeeded by active physical therapy. In cases of systemic hypothermia complicated by frostbite, it would appear advisable to delay rapid rewarming of the extremities until the deep body temperature has started to rise. The severity of the injury in depth and area will become apparent in time. It is for this reason that early amputation is undesirable.[20] If frostbite is of full skin thickness or more, some loss of tissue may be expected. In the absence of local infection, the dead tissue should be allowed to mummify and demarcate itself. In the early stage of the treatment of frostbite with necrosis of tissue, antitetanus measures should be taken. The final stage in the treatment of severe frostbite of the extremities will be restorative surgery and fitting of prostheses as indicated.

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(Continued on page 65)

ECHELONS OF MEDICAL CARE

W. S. HACON, MBBS, DHA, DCH.

The establishment of echelons of medical care would lead to an increased survival rate in a major disaster.

The development of the civilian emergency medical organization in Canada, the Emergency Health Services (EHS), to receive and treat large numbers of casualties, has been influenced by the extensive experience of the military medical services. The military medical services have refined certain techniques for reducing the apparently overwhelming task of caring for many casualties to a task of manageable proportions. These techniques can and should be used in major civilian disasters. They are :

1. The establishment of echelons of medical care.
2. The system of sorting casualties into priorities for evacuation and for treatment.
3. The standardization of treatment at each echelon.
4. The provision of early resuscitation and life-saving surgery.
5. The surgical techniques of early debridement and delayed primary suture.

By these means it has been possible to raise the survival rate of casualties from a basic 83.3 per cent rate which occurred with the minimum medical care provided during the Crimean War,[1] to the 96.4 per cent rate achieved by the United Nations medical services during the Korean War,[2] 100 years later.

The major problem in the provision of emergency care usually has been the lack of suitable facilities in the forward areas. Consequently, the casualties had to be brought back to appropriate facilities, in some instances for hundreds of miles. The medical services had to provide sustaining care and shelter at the various halts on this journey to enable the casualties to survive. They took advantage of this process of staging to institute progressive clinical care — the echelons of medical care.

With large numbers of casualties, the medical services ensured the maximum use of the treatment capabilities of every doctor at each echelon or stage by a careful division of labor. Economical division of labor was achieved by standardizing treatment. This in turn ensured that necessary procedures were carried out at the appropriate time and in the appropriate echelon.

There are four recognized echelons.

First Echelon

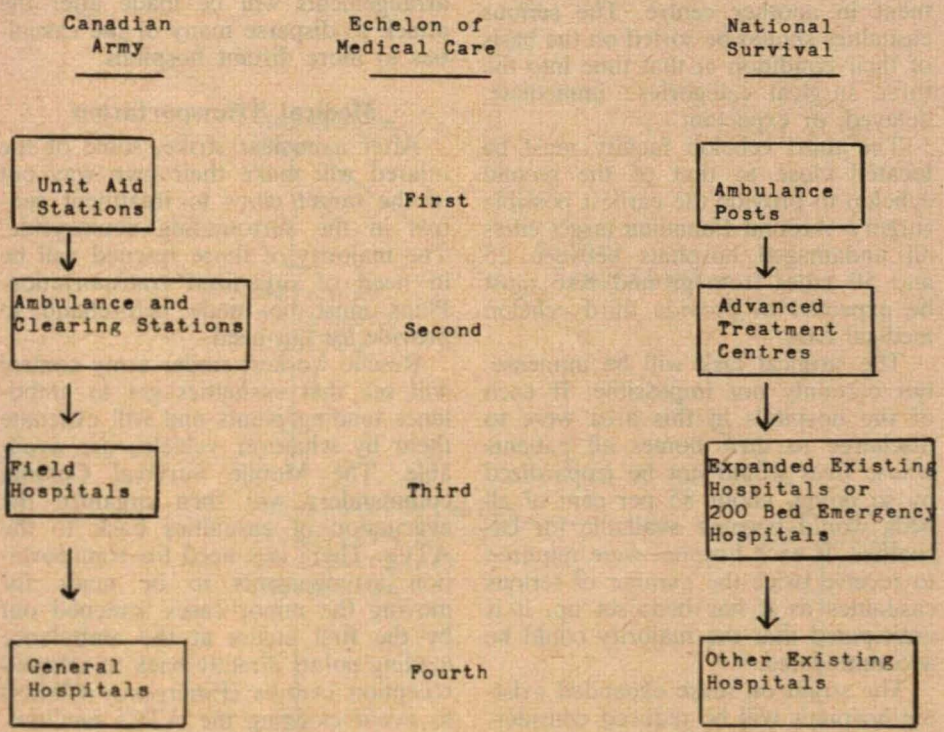
The immediate need of the wounded is for first aid treatment. First aid is, by definition, not a function of the professional medical services. It keeps many of the casualties alive until they can be taken over by these services. Analysis of post mortem reports on

soldiers killed in action reveals that one-quarter of these can be saved by rapid and good first aid treatment. In civilian disaster casualties might have to wait several hours before receiving professional medical care; thus the need for first aid is even greater. The numbers saved will be increased if at least one member of each family has a knowledge of emergency care. Such a standard is one of the principal aims of the educational program of the Emergency Health Services.

Second Echelon

At this level the casualty is given professional medical care for the first time. The primary task of the doctor here is to sort the casualties into priorities for treatment and for evacuation so that proper medical care may be given to those who are in desperate need. Only a small proportion of the casualties require active treatment at this time in the form of resuscitation and emergency lifesaving measures.

The casualty sorting techniques are fully described in the North Atlantic Treaty Organization Handbook, *Emergency War Surgery*.[3] The second Canadian edition is being printed by the EHS Division of the Department of National Health and Welfare. Briefly, the sorting categories in a mass casualty situation are: minimal, delayed, immediate, expectant.



The Canadian Army is responsible for the conduct of re-entry operations into cities damaged by nuclear weapons. The army plans to deploy a large number of Mobile Survival Columns to this task, the primary aim of which is to save lives. It should be possible for the first aiders in the columns to carry out a preliminary sorting of casualties into two basic groups, *serious casualties* and *minor casualties*. They would be placed in separate vehicles. The minor casualties could then be evacuated to bypass the subsequent echelons and thereby reduce congestion.

In Canada, the second echelon medical task will be assumed by the Advanced Treatment Centres (ATCs), each equipped to treat 500 serious casualties. The equipment for 600 ATCs has been stockpiled by the Federal EHS and is being preposition-

ed mainly around likely target cities. In non-nuclear disaster ATCs must be manned by civilians. Should Canada be attacked by nuclear weapons, the Army will be committed to its survival role and many ATCs may well be manned by military personnel.

Third Echelon

This is the key echelon of life-saving surgery. On arrival, the casualties are again sorted — this time by the most experienced surgeon present. He should send the minor casualties for treatment in another centre. The serious casualties should be sorted on the basis of their condition at that time into the three surgical categories: immediate, delayed, or expectant.

The third echelon facility must be located close to that of the second echelon to provide the earliest possible surgery. Around Canadian target cities all undamaged hospitals between 25 and 50 miles from ground zero must be expected to provide third echelon medical care.

The surgical task will be immense, but certainly not impossible. If each of the hospitals in this area were to discharge to their homes all patients whose lives would not be jeopardized by so doing, about 85 per cent of all beds would become available for casualties. If each hospital were required to receive twice the number of serious casualties as it has beds set up, it is anticipated that the majority could be accommodated.

The strain on these expanded existing hospitals will be reduced considerably by provincial EHS plans to open up 200-bed emergency hospitals. These are designed to provide third echelon care for 200 serious casualties in any suitable building such as a school. Equipment for the first 200 hospitals is now being assembled by the Federal EHS for prepositioning in the provinces. The staffs must necessarily come from health manpower resources beyond the 50-mile ring under provincial arrangements.

Agreement to standardize surgical treatment at the third echelon of care is an absolute prerequisite for the successful surgical management of mass casualties. This is understood and agreed to by the military surgeons of the NATO countries and by their civilian consultants.

Fourth Echelon

This is the echelon of full definitive surgical care, of surgical repair and rehabilitation. Patients might remain here for months or for years. Veterans from World War I are still receiving surgical care in DVA hospitals today.

Fourth echelon care in the national survival situation could be provided by the same hospitals that provided the third echelon care. In all probability arrangements will be made after the attack to disperse many of the casualties to more distant hospitals.

Medical Transportation

After a nuclear strike, some of the injured will make their own way out of the target cities to treatment centres in the surrounding countryside. The majority of those rescued will be in need of organized transportation. Plans must be made beforehand to provide for this need.

Rescue workers under army control will see that casualties get to ambulance loading points and will evacuate them by whatever vehicles are available. The Mobile Survival Column commanders will then organize the evacuation of casualties back to the ATCs. There is a need for transportation arrangements to be made for moving the minor cases screened out by the first aiders at the ambulance loading points directly back to selected reception centres (Emergency Clinics) to avoid clogging the ATCs facilities. There is a need also for a medical transportation organization to evacuate the serious casualties from the ATCs to the third echelon hospitals.

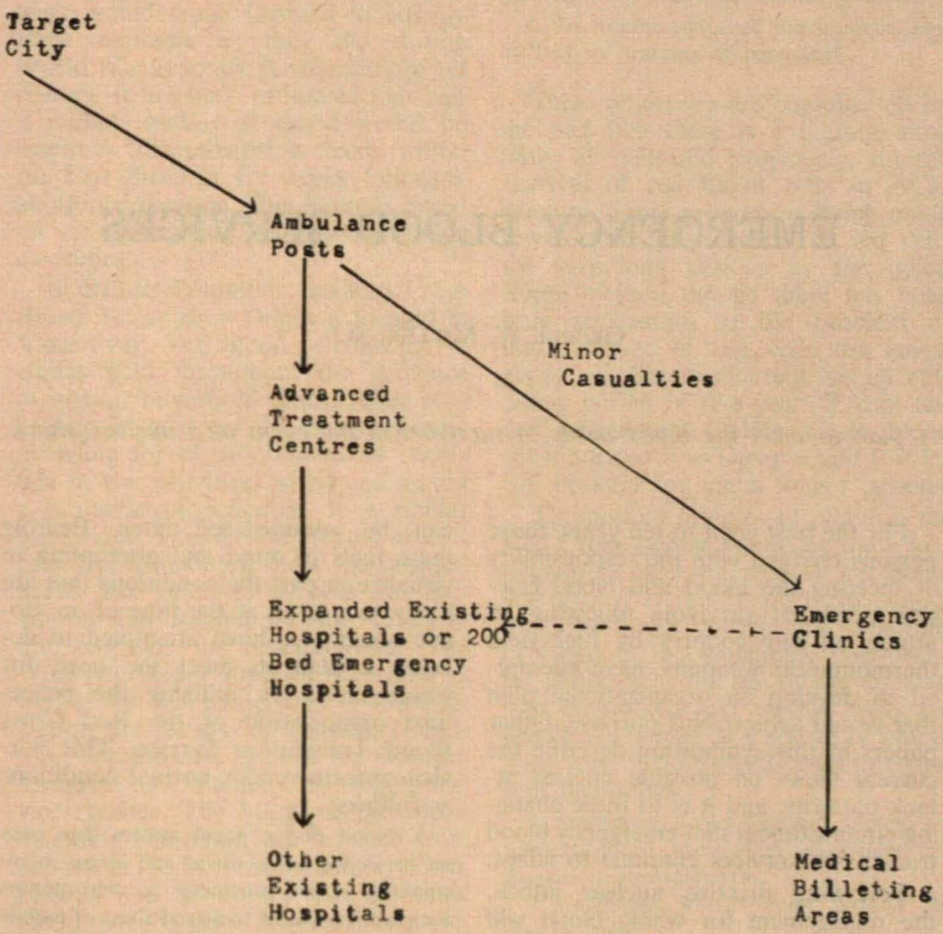
Surveys have indicated that more than enough civilian transport is likely to be available around Canadian target cities. A strong case exists for the Army to assume responsibility for all medical transportation arrangements back to the third echelon hospitals. This seems reasonable since the Army will have an organizing and controlling capability in existence at Target Headquarters at that time. Transfer of responsibility for evacuation to another agency would cause unnecessary confusion, particularly in the handling of

the direct evacuation of minor casualties. A decision has yet to be made.

Minor Casualties

Screening out minor casualties in the forward areas will assist the ATCs considerably in their task of resuscitating the serious casualties. The essential decision to be made by a first aider is "Can this casualty be moved 50 miles before seeing a doctor?" Successful application of this concept depends upon arrangements being made to receive the minor casulaties at a centre where they can be examined by a doctor, re-sorted, and given minor treatment if not redirected to third echelon hospitals. Such a centre should be called an Emergency Clinic.

The care of minor casualties would be but one of the several tasks that could be taken over by an Emergency Clinic. It should be prepared to look after all the medical needs of the community except third echelon surgery. In other words, it should be prepared to offer outpatient services as well as in-patient care to evacuees and residents; home visiting care in the medical billeting area; special care for maternity cases, mental cases and others. Plans for staffing and equipping these Emergency Clinics are now being considered.



Conclusion

Should Canada be attacked by nuclear weapons, its medical and hospital care resources might well be reduced to about one-half by losses occurring in the target cities. The remainder will be faced with an immense task of caring for many thousands of casualties. In the absence of planning it must

be expected that nearly 20 per cent of the casualties that are rescued will die from inadequate medical care and that many more will remain disabled. With planning, the mortality rate can be reduced.

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EMERGENCY BLOOD SERVICES

GEORGE W. MILLER, M.D.

A plan to meet the blood needs of survivors in the event of a nuclear attack.

For the past eight to ten years, those persons charged with the responsibility of meeting the blood and blood fraction needs of survivors following an attack on our country by high-yield thermonuclear weapons, have attempted to develop an organizational plan that would achieve this purpose. Other papers in this symposium describe the current views on possible nuclear attack patterns, and it is to these changing circumstances that emergency blood transfusion services continue to adapt.

Following massive nuclear attack, the requirement for whole blood will greatly exceed the supply usually carried in the country's blood banks. Moreover, these blood banks are, for the most part, located in potential target areas. Red cells cannot be preserved in suspension beyond three to four weeks, so that stockpiling of fresh blood against national catastrophe becomes unfeasible. To augment blood supplies which might remain available, plasma expanders and serum albumin can be used. Indeed, military experience has shown that plasma expanders, such as Dextran can control shock reasonably satisfactorily if whole blood can be administered later. Bearing these facts in mind and attempting to visualize in part the conditions that are likely to prevail at the time of an atomic attack, we have attempted to develop a plan to meet the need for whole blood by utilizing the peacetime organization of the Red Cross Blood Transfusion Service. This Service operates under normal conditions as follows:

A blood donor panel system has been set up in the cities, towns and larger municipalities in all provinces, so that donors are regularly called to attend fixed or mobile clinics and give their blood. The blood is collected and transported in refrigerator trucks to the nearest Blood Transfusion Service Depot where it is serologically tested for syphilis, grouped, typed and stored in refrigerators until distributed to hospitals. Blood reaching its outdating period is returned by hospitals to the depots where the plasma is drawn off and dispatched in pools to the Connaught Medical Research Laboratories, University of Toronto. Here the plasma is fractionated by the modified Cohn method and the fractions — fibrinogen, serum albumin, and gamma globulin — are obtained. These blood derivatives

are available to Canadian hospitals on demand. Out-of-the-way hospitals rely on serum albumin, 'O' negative blood, and the "walking donor" to meet their emergency needs.

In 1961, a total of 721,064 donors came forward to give their blood anonymously and without recompense to the Red Cross. In a national emergency there can be little doubt that volunteers would come forward in equally large numbers as they did during World War II to act as voluntary blood donors. It has been estimated that half a million bottles of blood would be essential for transfusion needs within the first three to six weeks following an atomic disaster. This figure is based on an assumption of 200,000 living casualties.

In British Columbia, the Red Cross Blood Transfusion Depot is located in Vancouver. The blood is collected at clinics held throughout the province at regular advertised dates. After processing in the depot the blood becomes available for distribution to all hospitals in the province on request or on a pre-arranged schedule. In a similar way Blood Transfusion Depots in Calgary and Edmonton meet the hospital needs for Alberta. Depots in Saskatoon and Regina provide blood to the hospitals in Saskatchewan. The Winnipeg Depot supplies Manitoba as well as the Lakehead area of Ontario. Depots are located in London, Hamilton, Toronto and Ottawa for Ontario. Montreal and Quebec City Depots service Quebec. The Maritime provinces, including Labrador, are serviced from depots in Saint John, Charlottetown, Halifax and St. John's. Beside whole blood, packed cells, platelet rich blood, fresh frozen plasma, etc., the depots also distribute the blood derivatives to the hospitals in their own area.

Within the framework of the above-mentioned peace-time organization, it would appear logical that *with pre-planning and adaptation a scheme for meeting the blood requirements of a national emergency can be developed.*

Objectives

An emergency blood program has in essence four objectives:

1. To organize a whole blood procurement and distribution program with despatch and precision to meet emergency situations.

2. To supplement this whole blood program with blood derivatives (serum albumin) plasma volume expanders, glucose and saline mixtures.

3. To make provision for the procurement and storage of supplies and equipment for the emergency blood program.

4. To recommend staff requirements and methods of training of personnel.

These objectives are complicated by the fact that there is a definite time limit, as indicated previously, on the survival of red blood cells in ACD solution. Some progress is being made towards the preservation of red cells for very long periods by the quick freeze method though there has been little application to the problem of mass storage of red cells for emergency use. Serum albumin has an outdating period of five years if kept under refrigeration, while whole blood substitutes such as Dextran and P.V.P., can be kept for much longer periods.

The normal reserves of blood in the Red Cross Depots would be quite inadequate to meet the needs of a national emergency. It is unrealistic to believe that one could collect large amounts of blood in the immediate post-disaster period near the site of the disaster. The devastated and fallout areas are practically denied as a source of blood. Two very obvious needs therefore present themselves:

1. Stockpiling serum albumin, plasma expanders, blood transfusion equipment and supplies in strategic areas.

2. Collecting whole blood outside the disaster area.

Framework of Plan

Sites have already been designated in each province for the stockpiling of essential emergency blood supplies and equipment. Generally speaking, the equipment is similar to that already in use in the Red Cross Blood program. A program for the cumulative and rotation stockpiling of serum albumin and certain transfusion equipment is being developed between the Red Cross and the Federal Emergency Health Services.

The Establishment of Shadow Depots

At present, Red Cross Blood Transfusion Depots, situated in the larger cities of Canada, are within the target areas. It is clear that a new operational unit that will form the key to the whole program must come into operation. Since this unit bears relation to the existing parent depot, it has been designated a "shadow depot."

The predicted fallout pattern for Canada is now available to Emergency Health Service. By applying this fallout data and by pre-selecting buildings possessed of adequate reduction factors, or to which improvements in shielding properties can be added with reasonable care, suitable areas and buildings can be selected in advance as operational sites for Shadow Depots. The selection of such sites and buildings is the responsibility of the provincial Emergency Health Services authority. Their actual operation is a municipal task.

The buildings will be used to store equipment and supplies and provide adequate space for the preparation of team equipment. A laboratory area for the reception of blood, processing, testing and dispatching of the packed blood will also be necessary. It is anticipated that blood can be stored in fruit or milk refrigerator vehicles based on the Shadow Depot premises.

Operational

To be realistic one should visualize the emergency program as coming into operation by stages:

Stage 1 would constitute the first 24 hours following the disaster. During this period the teams would bleed only group 'O' donors. Group 'O' is known as the universal donor blood and can be given safely in most instances without cross-matching. During this stage, recipients would receive 'O' blood, Dextran, serum albumin, glucose and saline. Donors, other than group 'O' who present themselves at the clinic, will be asked to report after the first 24 hours. Arrangements will exist for the proving of donors who do not have blood group identification.

Stage 2, covering the second 24 hours after the disaster, will be a transitional period during which group specific transfusions would commence. Donors would be grouped in the clinic and all blood further tested for group and type in the depot. All recipients would be cross-matched. Serum albumin, Dextran, etc., would continue to be used.

Stage 3 would be the period after 48 hours and presupposes adequate laboratory services. All blood would be cross-matched; serum albumin, Dextran, etc., would continue to be used especially where whole blood was in short supply.

The time period in the stages described above will vary with circumstances. At no time during the emergency period will blood be serologically tested for syphilis. In Canada, this is a justifiable and calculated risk. The mass grouping and typing of a population during peace-time is not recommended due to the clerical errors involved. Donors from a fallout area may be accepted if they are in good health. In this instance, the ordinary precautions taken to ensure cleanliness will suffice. If persons appear in the donor stream who have received enough radiation to produce clinical symptoms (acute radiation syndrome and skin lesions), they should not be permitted to give blood.

The actual transfusion of the patient is a function performed by the staff of existing and emergency hospitals. It is the duty of the Emergency Blood Service to transport the blood to the hospital area, and vehicles must be preallocated for this purpose. There is no reason why the Emergency Hospital Services should not carry out bleeding operations on their staff immediately following the disaster, if they find it convenient. The necessary bleeding sets, containers, etc., will form part of the Emergency Hospital Services' supplies and equipment.

Staffing

1. *Shadow Depot Personnel:* The Shadow Depot is the key to the entire operation; a headquarters' staff of the following personnel is envisaged:

Medical officer	— 1
Health supplies officer	— 1
Technicians	— 18
Laboratory assistants	— 2
Nurses	— 2

Nurse Aides	— 8
Clerk typists	— 2
Transport officers	— 2
Porters	— 12

2. *Collection Unit:* Each Shadow Depot, besides headquarters' staff, will have three collection units based on it. Each collection unit will have its own equipment and supplies sufficient for its three collection teams. These teams will proceed as mobile groups to centres in the immediate area where they will hold clinics. There are, therefore, nine collection teams based on each Shadow Depot; each team operates on an 8-hour shift round the clock. Each collecting team consists of:

Nurses	— 2
Technician	— 1
Nurse Aides	— 5
Receptionist	— 1
Clerk typist	— 1
Rest room aides	— 2
Canteen workers	— 2
Drivers	— 5

The total staff in and based on a Shadow Depot is 202. It is expected with three collection units of three bleeding teams each that 3,600 bottles of blood can be obtained daily (400 donors per team per 8-hour shift).

Training Program

In order to function efficiently during an emergency it is very essential to have trained and experienced personnel earmarked in advance:

Technicians with training and experience are in short supply in Canada. One source of technician material is the cadre of ex-Red Cross technicians. While the number is not inconsiderable, geographic distribution is not ideal. A second source of supply is found among pharmacists. The Red Cross Depots have conducted courses to train pharmacists in blood grouping and typing techniques.

Nurses. A trained and successful venesectionist is a rarity among professional staff. The Red Cross spends two months training a nurse in the art of venepuncture. Under these circumstances it may not always be possible to ensure that donor clinics will have adequately trained personnel, although in an emergency some margin of inexpertness is permissible. The Red Cross Alumnae nurses will be the chief source of supply for the emergency bleeding teams. Every effort will be made during routine peace-time clinics to indoctrinate any nurses who may be earmarked by the provincial Emergency Health Services authority for this position. Representation has been made to the larger schools of nursing to consider introducing basic training and experience in venepuncture technique to their student nurses.

Nurse aides are not professionally trained and experience in routine clinic assistance can be gained by those designated as aides during the regular peace-time clinics.

Other personnel such as clerks, registrars, canteen workers, drivers, porters, etc., may also receive indoctrination during peace-time local blood donor clinics.

Conclusion

The above plan is the result of the combined thinking of many people in the various fields represented. It is practical and sufficiently flexible to permit on-the-spot changes to meet new situations during the disaster period. We have sufficient confidence in the altruism of the Canadian people that they will come forward in sufficient numbers to guarantee that adequate blood supplies will always be available to meet the needs of suffering humanity in both war and peace.

(Continued from page 57)

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Disaster Nursing in the Basic Curriculum

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"In your hospital experience, have you encountered any patients who were victims of a disaster?" In reply to this question by the nursing instructor, the first reaction of the student is to say "No." However, on closer analysis she begins to realize that illness, accident, or other forms of stress are usually personal and family disasters to those involved.

From her first introduction to disaster nursing on the more personal level of her patients and their families, the student nurse develops an awareness of the results of such situations on human beings. She widens her horizons to include the effects of greater or more widespread disasters such as floods, tornadoes, fires, earthquakes or war. In the event of war, particularly the kind which threatens us today, all citizens will need to work together for survival. Some, because of their preparation, will have more specialized obligations. The nurse, as a member of the health professions, must be ready to take her place and perform her tasks with the health services. How are we to prepare her for this in her basic program?

In the pamphlet *I.C.N. Basic Principles of Nursing Care,** Virginia Henderson gives her concept of the function of the nurse :

> The unique function of the nurse is to assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or to peaceful death) that he would perform unaided if he had the necessary strength, will or knowledge. And to do this in such a way as to help gain independence as rapidly as possible.

She goes on to discuss fundamental human needs and their relationship to basic nursing.

The *Curriculum for English Language Schools* of the Association of Nurses of the Province of Quebec contains this introductory paragraph :

> This curriculum is a guide to teachers who are preparing young women to nurse in our society. In building this guide, the Curriculum Committee recognized that an understanding of the nature of man, the characteristics of our society, and the fundamental laws of order are essential to the practice of nursing. These themes form a structure on which the curriculum is built.

The inclusion of "disaster nursing" in the basic course is recognition of one of the characteristics of our society. It is based on knowledge of the nature of man and his fundamental needs. In preference to presenting this aspect of nursing as a separate course during the first year for students at St. Mary's Memorial Hospital, Montreal, we integrate it into the various courses already offered. In sociology and community organization, the student becomes aware of the interdependence of man upon other human beings, especially in our modern society. The trend

towards urban living and industrialization makes it clear that when natural disasters strike a large number of people are affected. When industrial accidents occur they frequently involve many victims. In addition to the physical care required, knowledge of group psychology and group reaction is essential. Elements of fear, even to the point of panic, can complicate the assistance offered.

If nursing is taught from the viewpoint of basic human needs, it becomes easier to plan care, both for the usual patients to whom a nurse will render service and for the victims of a mass disaster. These needs are set forth in our medical-surgical nursing course outline. Their application in specific detail is omitted in this discussion since this depends upon the individual situation.

Physical needs begin with those necessary to maintain life. Maintenance of normal respiration runs the gamut from removal of obstacles obstructing the air passages to administration of artificial respiration in asphyxiation. Adequate nutrition implies availability of food and water, proper preparation of it for human consumption and, at times, actual assistance in feeding. Included also is the importance of esthetic appeal of food service, and the relief of emotional and physical stress as aids to the digestive process. When there is interference with the ability to eat or drink, how is this deficiency overcome? What adaptations are made in the diet when the physical condition of the patient requires it? In providing for elimination the student must know why the body produces waste, and how these products are eliminated. Other physical needs relate to provision for adequate sleep and rest; maintenance of body temperature within normal range; desirable posture; cleanliness and good grooming. Protection of the integument is an integral part of the latter. In addition to knowing how specific illnesses affect basic needs the student becomes aware of the effects of stress on each of them.

Moving from the personal to the social, one finds the need to avoid dangers in the environment and injury to others. There are safety factors that deal with mechanical dangers, toxic chemicals, animal and insect pests. The student nurse is alerted especially to prevent the spread of pathogenic microorganisms. Man's social, psychological and spiritual needs include his requirement to communicate with others in expressing himself, his emotions and aspirations. His nature demands that he work at something which provides a sense of accomplishment; that he participate in some form of recreation. To learn and to discover new things satisfies normal curiosity and leads to normal development and health. Man's spiritual values include his concepts of right and wrong; his innate need to worship God. Respect for these values will result in provision for spiritual assistance.

When nursing is taught in this manner, a uniform theme or thread ties up the various "courses" and gives them meaning. The application to nursing care becomes more obvious. Modifications required by the patient's condition are easier to determine when consideration is given to the basic need that has been affected. The student learns early how various experiences, including illness, affect the patient's ability to maintain his basic needs. She discovers which needs are not being met. She learns to assess each nursing situation with these concepts in mind and, subsequently, to formulate the principles upon which her nursing care must be based so that her patient may gain independence as rapidly as possible. Reference is made at appropriate times, to the types of injuries that can be expected in disasters. The basic treatment is similar regardless of the cause.

In the third year we devote 10 hours to disaster nursing as such. The student has had experience. She has reached the point of reflecting that, in large disasters, provision for general community services may be interrupted. She is encouraged to bring newspaper reports of fires, tornadoes, etc., and to discuss them in class with their implications. Life experiences are valuable. For example, an ice-storm in Montreal two years ago disrupted the power lines and left suburban areas without electricity for several days. Consequently facilities for heating,

lighting and cooking were lacking to many. Discussion can lead to speculation on what happens when the water supply becomes contaminated or shut off, or when other vital services fail. From this, consideration of the effects of modern nuclear warfare follows easily. Films help to illustrate.

The national, provincial and local civil defence organizations are studied with specific emphasis on the role of the nurse and her special responsibility because of her preparation. It is essential for her to know how coordination of the various services is achieved; how she fits into the total picture. Her familiarity with welfare services responsible for provision of food, shelter and information will assist in the development of her own functions.

It is in her final year that the student learns how to delegate responsibility, how to instruct workers with little or no preparation. This is an important factor in mass disaster. The skill and knowledge of each person must be used to capacity in order to benefit the greatest number.

Various methods of teaching can be used. The students at St. Mary's Memorial Hospital have developed a scrap book. It illustrates civil defence organization in Canada, and depicts the close cooperation achieved from the national down to the local level. The functions of the various members of the organization are outlined so that the nurse knows who is responsible for different activities, and thus becomes an agent in achieving coordination. Debates, discussion groups, buzz sessions, and other forms of class participation are used extensively.

The hospital disaster plan is presented by the medical officer in charge of it. A plan was originally prepared for this hospital in January 1955. At that time, with the aid of the National Civil Defence authorities, a demonstration was given which simulated the admission of 300 casualties. All hospital personnel were involved. Some of the students acted as victims. Eventually staff changes left only a small number familiar with the procedure. Physical additions to the hospital and nurses' residence completely changed many of the areas previously designated. It became essential to have the plan completely renovated. A special committee composed of representatives from each department was made responsible for this renovation, and for its continuing revision.

Hospital personnel must know their functions in case of disaster. Representatives from individual departments are responsible for keeping their employees informed. In the department of nursing, this is accomplished through staff education programs. Special sessions are held for staff nurses, nursing assistants, orderlies and other auxiliary workers. It is desirable that demonstrations, even though on a limited scale, should be used for this purpose. Again, the medical officer in charge has a large part to play in interpreting the total over-all program.

What is the purpose and value of all this effort? The first value is the development of a positive attitude in order to overcome the spirit of indifference or hopelessness that assails the uninformed. Prior to discussion of disaster programs, it is common to find persons who say, "What is the use? If an atomic bomb is dropped we will all be annihilated." It comes as a surprise to them that there could be survivors and, in fact, that those surviving have a direct responsibility for the assistance of others. If we are to have any hope, should such an enormous disaster befall us, it must come from our preparedness to face any eventuality.

Another value is the state of preparedness for meeting disasters of lesser magnitude which, nevertheless, may involve large numbers of people. Who is to say when a flood, tornado, or other such calamity might overtake us? What would we do? Advance planning assists in the prevention of panic, gives everyone the security of knowing where he or she can be of the most assistance, and above all, saves lives and prevents suffering through coordinated efforts. In this, we, as nurses, have a great obligation.

As teachers of nurses, we are bound to prepare our charges so that they can render nursing service wherever and however it is needed in our society, not only today, but also tomorrow.

The Public Health Nurse in Disaster Nursing

HELEN GEMEROY, M.A.

The contribution of the public health nurse to disaster planning is three-fold: information, preparation, action.

The public health nurse is an information officer since she interprets healthful living. She knows how to get her message across to the people. She influences public opinion through her services. She knows the people and the community. She is familiar with local ways of doing things; with the beliefs as well as the topography of the community, the barriers and the gateways to communication. The skills and knowledge that she uses every day can be adapted to a disaster program. Many public health nurses have been active on the planning level in various parts of Canada; many others have more to contribute than they realize.

The Nurse's Knowledge

For practical purposes psychological aspects may be regarded as those related to the total reactions of individuals, taking into account their relationships to their environment, to themselves and to other people. The public health nurse works in these areas every day. Her professional background provides her with basic knowledge from the social sciences and through her daily experience she adds to this store of knowledge. The nurse does not work alone. She works in relation to other people. She offers her services to an individual in relation to himself, his environment, or other people — perhaps all three at once.

For example, when the public health nurse visits a new mother and baby she comes to inform the mother of clinic services, and to offer her assistance with any problems that may have arisen with this youngest member of the family. She finds an anxious, harassed young woman with a two-week-old baby and a child of three years. It is true that the nurse tells the mother of the clinic's services but if the nurse is wise, she also encourages the mother to speak of her problems. She may help her with practical suggestions concerning the baby's routine of feeding, bathing, etc. The mother may be greatly concerned about the reaction of the three-year-old child to the new baby. The nurse listens. She may be able to give the mother a better understanding of the older child and suggest various ways of handling the problem. If the visit is successful the mother will feel more competent to deal with her little family when the nurse leaves. At least she will know that someone understands her difficulties. In one visit, then, the nurse may modify the mother's attitude toward herself by helping her to feel more competent; she may help the

mother with practical suggestions and so enable her to modify her relationships with the environment.

Upon what factors does the success or failure of such a visit depend? If the nurse wishes to advise the mother about the baby's formula, she must know something about feeding babies. If she is to advise her about bathing the baby, she must know how to do so herself; how to improvise with the equipment available and how to arrange it most effectively, taking into consideration the conditions of the home. If she is to advise her about the three-year-old's reaction to the baby, she must know something about the development of children.

It is quite possible, however, for a nurse to have valuable knowledge in all of these areas but to be unable to convey much help or assistance to the mother in the solution of her problem. To be successful the nurse must be able to recognize the mother's reaction to a stressful situation. She must be able to relate to the mother in a way that will permit the latter to uncover the areas of stress. She must understand the family, groups and the ways in which people interact. She must be aware that the addition of a new member changes patterns of interaction, as well as roles, in the family. She must know something of the community, its customs and beliefs and of the particular ways in which the people of that community habitually meet or adapt to change.

Agent of Change

A plan for change, no matter how sound it may be, is unlikely to be accepted by an individual, a family or a community if it does not fit in with the ongoing system of values, beliefs, and customs. It is through research in the field of public health more than any other specialty in medicine that we have become convinced of the possibility of controlling or modifying human behavior through rational understanding of individuals and of groups. This control of human behavior is not to be confused with manipulation of persons without their knowing what is happening to them. Control is achieved by modifying or changing factors in a situation so that the individual sees the total situation differently or more broadly and, as a result, makes decisions or responses that are more appropriate to the realities of the situation.

The public health nurse could easily see herself as an agent of change — change in individuals, groups such as families, organizations such as industry, and the community. She has knowledge of each one of these systems. She, herself, operates upon this knowledge but often without awareness. She has an obligation to organize this knowledge, not only for her own use but for the use of others.

What do you know of the social system of the agency, industry or community in which you work? What is the common pattern of interaction between individuals in the families of your community, in the community itself, in the institution or the agency? What is the cultural system — the habitual behavior of the people, the ways they use physical materials, their beliefs. In relation to the day-to-day work in your area, industry or agency, what do you put in the records? What knowledge do you have that can be passed on to others because it is in a suitable form?

Disaster Planning

In a disaster situation no one has time to acquire the knowledge and skills necessary for effective action. Preparation begins through making the best use of learning opportunities that occur each day. In addition, some knowledge of how people behave in disaster situations has been accumulated by experts through their on-the-spot observations. It is on the basis of such research that three phases of disaster have been described: the period of impact, the period of recoil, and the post-traumatic period. The principal role of the nurse in each phase can be formulated from these descriptions.

Need for Leadership

During the period of impact, when physical stress is greatest on the individual and the group, heavy demands are placed upon nurses for leadership.

They carry a major responsibility for primary prevention of psychiatric casualties. Studies have indicated that only 10 to 25 per cent of victims remain sufficiently alert and in possession of rational control to permit them to appraise the situation, and to act purposefully. The majority will be in a stunned state, devoid of subjective feeling and responding automatically. Others will show increased dependency to the degree that they will follow any form of suggestion or leadership, good or bad. A small but very disturbing group may be unable to move, may run and scream, or manifest other types of purposeless activity. These are reactions to acute danger — anticipated ways of handling fear and anxiety.

Since the nurse will have leadership responsibilities, whether she wishes to have them or not, she should be able to recognize the variety of ways in which people handle extreme fear and anxiety. Only on the basis of such knowledge can she identify those persons to whom she can delegate responsibilities immediately because they are in full possession of their faculties. Those who are stunned, whose field of attention is narrowed but who can follow direction automatically, must be placed under competent leadership, given some definite task or responsibility within the limits of their present functioning and, in this way, removed from dangerous influence. Those who are highly disturbed require firm leadership and direction and, at the same time, an understanding of their behavior. They need reassurance and support, preferably from someone they know who can call them by name. The nurse, especially when she is in uniform, has a distinct advantage. Even if she is unknown to those whom she is attempting to help gain self-control, most people think of her in terms of "listening" and "helping" and will relate to her on the basis of this image.

Records

As early as possible following a disaster an organized plan for registering survivors and casualties should be instituted. Nurses are cognizant of the values of such records. They appreciate that the process of giving familiar information, such as one's name and address, may help an anxious or a dazed person to know who he is, where he is and how he is. Information of this nature enables anxious relatives to get in touch with one another. It is now recognized that separation of family members during the acute period of disaster appears to be most unfavorable, socially and psychologically, particularly for children.

These matters of identification and of support from significant people may prove to be the most effective means of controlling those who are acting out their fears. Disruptive individuals should be removed from the scene only if these means of control are ineffective. When it is necessary to remove patients, they should be accompanied to a centre where treatment is available for their specific symptoms. These symptoms may be psychological, such as extreme restlessness, overactivity and confusion, or physiological such as increased respiration, gastro-intestinal upset, incontinence of urine.

Recovery

The degree of social disorganization following disaster is often so great that, if the community is to recover quickly, help must be provided from regions on the periphery or beyond the affected area. Nurses may find themselves called upon to act in a disaster situation that they themselves have experienced directly, or they may be brought in to the disaster area from outlying districts. The nurse may be expected to work under unfamiliar emergent leadership while, at the same time, recognizing emerging leaders and making use of their qualities. When she comes in from outside, the nurse will need much understanding and acceptance of those who have experienced the disaster and are working in the situation. The latter are likely to be irritable and unreasonable at times; difficult to work with; unable to follow prearranged plans.

Dependency

In the period of recoil, initial stresses are suspended but new ones may make

their appearance. This is the period during which the majority of victims first experience subjective awareness of feeling as they begin to realize what they have experienced. The kind of help that they require changes. Now they need to talk about or ventilate the experience; make some sort of temporary living arrangements; try to discover the fate of loved ones. Those who previously had asked for nothing want to be given something, to be looked after. According to one authority this period of dependency is transitory and lasts only a matter of hours or a day or two for most people.

Group Organization

The nurse's role is, traditionally, a giving one. She will be called upon to give much during this period herself but she must also organize or work with others who can assist in the giving, whether it is the gift of time to listen or more practical assistance such as food, direction to shelter or a bandage. Groups begin to form and, under effective leadership, they may be able to sustain the individual and act as a powerful motivation for unselfish behavior. The nurse can utilize group formations for constructive purposes. She can encourage them to care for dependent, helpless or disturbed individuals and spread the giving to many more.

Rumor Formation

Although rumors may begin to spread during the impact phase of disaster, they are much more likely to develop serious proportions during the phase of recoil when there is a much greater urgency to talk. Social scientists who have studied rumor formation tell us that it represents the result of attempts to secure reliable information but that it may also be the outcome of hostility. At times we have all felt a need to blame others and to justify our own behavior. Overt expressions of anger that could result in panic and mob behavior must be avoided and anger channeled into useful directions. The possibility of rumor arising can be reduced by giving attention to effective devices for communication. Nurses should be fully aware of the possible results when information is withheld or blocked. A high value should be placed upon clear, concise communication not only to forestall rumor formation but to reduce anxiety and prevent impulsive irrational behavior.

Later Responsibilities

The third and last phase of disaster is the post-traumatic period. The actual danger is past and efforts are underway to reorganize the lives, families and communities in the disaster area. This phase has no limit in time but, according to authorities, may last for the remainder of an individual's life. The same is true for communities and countries. Those severely affected by disaster may recover and reorganize but never on quite the same basis or in quite the same form as their earlier organization. The nurse's responsibility may lie mainly with those survivors whose disorders are of a more serious nature, or with those who had few early symptoms during the period of actual stress but in whom symptoms are now appearing for the first time. Such disorders resemble those displayed by patients in psychiatric settings. They include fatigue states and depressive reactions that result from severe anxiety over a period of time. Other related disorders such as severe nightmares, conversion symptoms or dissociative reactions may be seen.

Summary

The more rapidly psychological disorders are identified and adequate treatment instituted, the more likelihood there will be of rapid recovery with good prognosis. During the first phase it is most desirable to treat all casualties close to the scene of disaster removing only those whose symptoms cannot be controlled by available means and who are proving to be disturbing influences. In the second phase a large part of the nurse's responsibility has to do with organization of services for those whose psychological needs are great. In addition she must be alert for those who are overactive, overzealous and working long hours. Unless they are encouraged to

moderate their activities they may become exhausted and suffer a post-traumatic reaction which is often difficult to treat and control.

Conclusion

The public health nurse's contribution has been discussed under the headings of knowledge, preparation and action. Most public health nurses have or acquire a fund of useful knowledge in the course of their daily work. This information often is not recorded. In a variety of ways the public health nurse is already trained to operate effectively in disaster situations. She meets crisis situations in families and in the community almost daily. She knows how people and groups react to disaster. She recognizes that she can be a force in the movement toward greater stability in a crisis situation. She has valuable information that she can make available to those planning a community program such as that necessary for meeting widespread disaster. Naturally this knowledge must be adapted to individual situations.

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PROTECTION OF YOUR FAMILY

EVELYN A. PEPPER

Every day, each Canadian family takes simple steps to ensure its continued peace-time survival. The purchase of food, medicines, clothing and insurance is a clear example of the acceptance of such responsibility. How much more is needed to provide your family with the best chance of survival in a nuclear attack?

About half the hours of each day, all members of the family are together in the home. If warning comes at this time, plans can be devised rapidly but necessary supplies may not be available. If warning comes with the father and the mother at work and the children at school, no plans can possibly be improvised; the family is open to destruction. Family survival planning is vital to survival.

Other articles in this symposium

describe the facts that people need to know about the dangers of nuclear attack. This presentation attempts to provide a reasonable program for the protection of the family. The steps are outlined and an interpretation of the action that should be taken now is given.

1. *Know the effects of nuclear explosions.* A potential enemy recently detonated, for test purposes, a nuclear weapon equivalent to 9 million tons of T.N.T. Learn what this means in terms of destructive energy dropped during a nuclear attack. The Emergency Health Services manual prepared by the Special Weapons Section on nuclear weapons, is available for study. Write to your provincial emergency health services director for it today.

2. *Know the facts about radioactive fallout.* Fallout is a menace to the health of the family. Protective measures can and should be taken. Know what these measures are.

a. The best protection is a shelter within your home. A fallout shelter can make the difference between severe illness or death, and no clinical manifestation of even mild radiation sickness. Several booklets are available to guide you in construction of a shelter. These are: *Simpler Shelters, Basement Fallout Shelter, Your Basement Fallout Shelter,* and *Blast Shelters.*

b. Personal contamination with radioactive dust is undesirable. It can give rise to skin injury but does not cause serious radiation sickness or death. Early personal decontamination should be practised. You should acquaint yourself with the simple procedures recommended in the EHS manual.

3. *Know the warning signals and have a battery-powered radio available.*

a. There are three types of warning: the alert, take cover, and all clear. All members of the family should be able to recognize the message being given to them by the warning sirens. If you do not know them already, turn to page 16 of your E.M.O. manual, *11 Steps to Survival.*

b. As head of the house, you should procure a battery-powered radio for use if electricity fails. This could be your only contact with the community outside and the people responsible for advising you during your shelter life.

4. *Provide fourteen days' emergency supplies.* Space in a shelter should be restricted to those essential items that will guarantee first aid, warmth, food, safe water, sanitation, rest, communication and recreation for the occupants. *Your emergency Pack,* a publication of Emergency Welfare Services, provides lists of essential items. Lists are also to be found on pages 23-35 of *11 Steps to Survival. Family Health Planning for Disaster* prepared by E.H.S. is an excellent reference for the family.

5. *Start training now.* St. John Ambulance teaches the fundamentals of first aid in disaster. Both that agency and the Red Cross Society teach home nursing. See that at least one person in your family besides yourself is trained and that an adequate first aid kit is always available. In a disaster situation, medical assistance will be in short supply. Your family must be trained to be self-reliant.

As a member of the health professions, you will be required to assist physicians in their great task of casualty care. First aid, life-saving treatment, resuscitation and anesthesia are tasks that you should be prepared to accept in the casualty care program. Your first duty is to your family but once they are safely established you are expected to report to the nearest health assembly point on the periphery of your community.

A list of first aid supplies recommended by E.H.S. appears on page 52. Check your family first aid needs. The recommended quantities are for a family of four.

6. *Know your community plan.* Every municipality must have an emergency plan to meet disaster. Every resident in the municipality should know what that plan is. As a mother or possibly a school nurse you should be certain, for instance, that the local plan includes a school plan. As a nurse, you should know the plan of your local hospital, as well as that of your place of employment if you work outside a hospital.

You will develop better plans for your family and your co-workers if you know the basic disaster plan for your community. Two booklets, designed to assist the city dweller, are recommended to help you to fulfill your obligations. They are *Survival in*

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Likely Target Areas and *Welfare Tips for Survival.*

7.*Know where you and your family are going.* In the 16 urban areas that are potential targets, emergency measures officials and municipal police are preparing traffic control plans to permit the voluntary evacuation of the city. Evacuation routes are radial to the centre and the plan will not permit cross traffic. Consequently, on the alert warning, members of the family who happen to be in sections of the city other than where the home is located will probably be unable to reach home in time. If a city traffic plan is not in effect, it is highly likely that chaotic traffic conditions would preclude the gathering together of the family. Every one must know what action he or she is to take as an individual and where the family is to reunite after the attack. In short — know where you and your family are going!

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Conclusion

If the time to act comes, you must, in fairness to your family, yourself and your country, have a plan of action. The time to plan is now. The family that plans together, stands together. The decision is yours !

References

The following publications may be obtained free of charge by writing to EMO, P.O. Box 10,000 in the capital city of your province.

1. *11 Steps to Survival*
2. *Your Basement Fallout Shelter*
3. *Basement Fallout Shelters* (for new homes)
4. *Simpler Shelters*
5. *Blast Shelters*
6. *Survival in Likely Target Areas*

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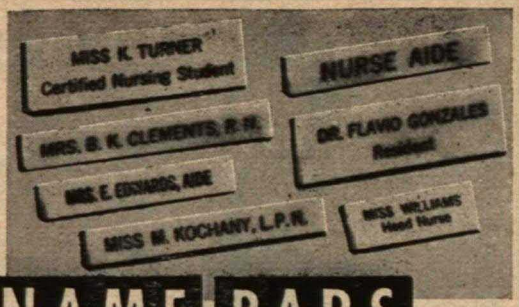

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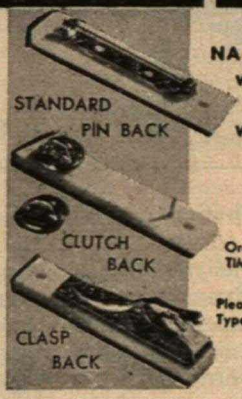

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Admiring the entrance to the new residence for nursing sisters at the Canadian Forces Hospital in Kingston are Maj. Elizabeth B. Pense (right) who unveiled the plaque during official opening ceremonies in September 1962. The building was named "Emma Pense Hall" in honor of Lt.-Col. Emma F. Pense (left) who was the first Matron-in-Chief of the nursing service of the Second World War. Both Lt.-Col. and Maj. Pense are retired members of the Royal Canadian Army Medical Corps.

Construction of the new permanent building, with rooms for 30 nursing sisters and suites for two matrons, was begun in the fall of 1960 and completed in February 1962. It replaced an old war-time building which previously housed the nurses.

— Department of National Defence, The Canadian Army.

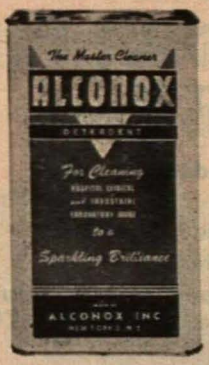
(National Defence Photo)

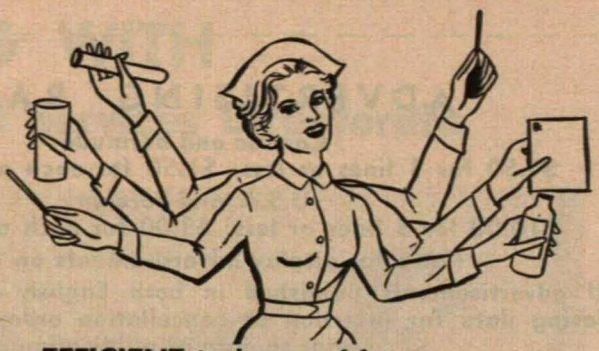
The following publications may be procured by writing to your provincial Civil Defence Coordinator or the provincial Emergency Health Services Director.

1. *Nuclear Weapons Section*
2. *Family Health Planning for Disaster*

The following publications may be obtained by writing to your local provincial Civil Defence or Emergency Measures Organization officials.

1. *Welfare Tips for Survival*
2. *Your Emergency Pack*





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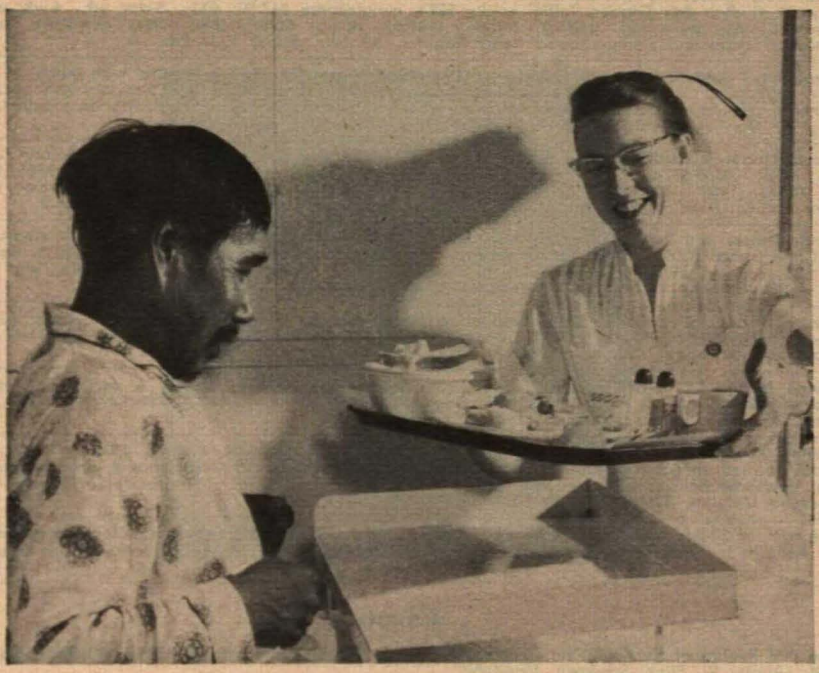

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General Duty Nurses for 40-bed hospital. Salary for B.C. Registered Nurses $320-$387 & $305 for non B.C. Registered. Nurses' residence available. Apply: Director of Nursing, Nicola Valley General Hospital, Merritt, British Columbia. 2-41-1

General Duty Nurses for 110-bed hospital in northwestern B.C. Salary—non-registered $309, B.C. registered $324-$389. Travel allowance, newly furnished residence available. For full details contact: Director of Nursing, General Hospital, Prince Rupert, British Columbia. 2-58-2

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Registered Nurses, general floor duty, rotating shifts. Modern residence accommodation. Basic salary: $350 with 6 monthly increments for 2 yrs. Apply to: Matron, Margaret Cochenour Memorial Hospital, Cochenour, Ontario. 7-29-1

Registered Nurses for General Duty in all departments including premature and new-born nursery, Isolation, Emergency and Recovery Room. Good salary and personnel policies. Apply: Director of Nursing, Victoria Hospital, London, Ontario. 7-73-10

Registered Nurses for General Duty and Operating Room. Salary according to experience and qualifications. Apply: Administrator, St. Joseph's General Hospital, Parry Sound, Ontario. 7-97-1

Registered Nurses for General Duty & Operating Room in modern hospital (opened in 1956). Situated in the Nickel Capital of the world, pop. 80,000 people. **Salary: $325 per mo.** with annual merit increments, plus **annual bonus plan,** 40-hr. wk. Recognition for experience. Good personnel policies. Assistance with transportation can be arranged. Apply: Director of Nursing, Memorial Hospital, **Sudbury,** Ontario. 7-127-4

Registered Nurses for General Duty in modern 18-bed Private Hospital in iron mining town, 140 miles north of Sault Ste. Marie, Ontario. Starting salary $310 min. to $360 max., less $20 per mo. maintenance. Recognition for experience up to 3 years. Good accommodations & personnel policies. Transportation allowance after 6-mo. **Operating Room Nurse** starting salary $364 min. with postgraduate course to $414 max. with recognition for experience. Apply: Superintendent of Nurses, Lady Dunn Hospital, Wawa, Ontario. 7-140-1

Registered or Graduate Nurses for modern 100-bed hospital located in summer resort district, 40-mi. from Ottawa. Apply: Director of Nursing, Public Hospital, Smiths Falls, Ontario. 7-120-2

General Duty Nurses for an accredited 66-bed hospital. Starting salary: $305. Excellent personnel policies, pension plan, residence accommodation only 10 min. from downtown Buffalo. Apply: Director of Nursing, Douglas Memorial Hospital, Fort Erie, Ontario. 7-45-1

General Duty Nurses for modern 100-bed hospital. Registered Nurses $315-$345 per mo., Graduates $250-$285; 40-hr. wk., benefits include accident, sickness & life insurance, hospital and medical insurance plans, & OHA Pension Plan. Apply: Miss Tillett, Director of Nursing, Leamington District Memorial Hospital, Leamington, Ontario. 7-69-1

General Duty Nurses for 100-bed modern hospital, southwestern Ontario, 32 mi. from London. Salary commensurate with experience & ability; $300 basic salary. Residence accommodation available. Pension plan. Apply giving full particulars to: The Director of Nurses, District Memorial Hospital, Tillsonburg, Ontario. 7-131-1

General Duty Nurses Male & Female & Certified Nursing Assistants (Immediately) for 86-bed hospital, 40-hr. wk., 8 statutory holidays & other employee benefits. Collingwood is situated on Georgian Bay & is noted as a vacationland with 7-mi. sand beach and great skiing on the Blue Mountains in winter. For further information apply: Director of Nursing Services, General and Marine Hospital, Collingwood, Ontario. 7-31-1

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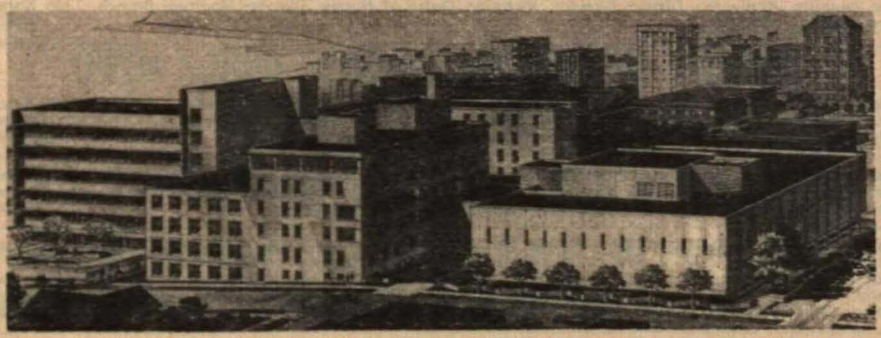

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Public Health Nurses (qualified). Salary $3,800-$4,800, employer shared pension plan & other benefits, car allowance. Apply to: Mr. A. F. Stewart, Secretary-Treasurer, Wentworth County Health Unit, Court House, Hamilton, Ontario. 7-55-14

Public Health Nurse (qualified) for general program in town & rural Health Unit, minimum salary $3,700, 4-wk. vacation, car allowance. Apply to: Dr. D. H. Davison, Dufferin County Health Unit, Shelburne, Ontario. 7-117-2

Public Health Nurse (Qualified) for generalized program in rural & semi-urban area adjacent to metropolitan Toronto. Excellent working conditions including pension plan, group insurance, & transportation arrangements. Write: Dr. R. M. King, York County Health Unit, 64 Bayview Avenue, Newmarket, Ontario. 7-84-2

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Registered Nurses. Excellent opportunities in **Private Nursing** are available in Bermuda. Rates similar to those in effect in Province of Quebec. For information regarding openings write to Matron. King Edward VII Memorial Hospital, Bermuda. 13-1-1

Registered Nurses for Operating Room with operating room postgraduate course and/or experience, for 150-bed hospital. Travel allowance paid. For particulars, write: Matron, King Edward VII Memorial Hospital, Bermuda. 13-1-1B

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Operating Room Supervisor for modern, accredited 55-bed hospital. 40-hr. wk., 1-mo. vacation. Living accommodation available in new motel-style nurses' residence. Apply stating qualifications to: Superintendent, Barrie Memorial Hospital, Ormstown, Quebec. 9-52-1

Assistant Head Nurses; excellent personnel policies. Apply Director, Shriners Hospital for Crippeld Children, 1529 Cedar Avenue, Montreal, Quebec. 9-47-42

Registered Nurses & Certified Nursing Assistants for modern 55-bed General Hospital, salary $300 per mo., 5 semi-annual increases, 40-hr. wk., 4-wk. vacation. **Certified N.A.** starting salary $210, 3-wk. vacation, accommodation available in new motel-style residence. Apply: Superintendent, Barrie Memorial Hospital, Ormstown, Quebec. 9-52-1A

Public Health Nurses — Salary range $3,780-$4,440, consideration given to experience, uniform allowance, fringe benefits. Apply to: District Director, Victorian Order of Nurses, Greater Montreal Branch, 1246 Bishop Street, Montreal 25, Quebec. 9-47-53

SASKATCHEWAN

Matron, experience preferred (duties to commence as soon as possible after December 15th), for 22-bed hospital. Salary according to experience, SRNA personnel policies in effect, nurses' residence, two (2) Doctors. Apply: Secretary, Union Hospital, Vanguard, Saskatchewan. 10-129-1

Registered Nurses (2) for 15-bed hospital, salary and personnel policies according to the SRNA, residence accommodation available for $34 per mo. Located close to Saskatoon. Direct applications stating age and experience to: The Matron, Union Memorial Hospital, Delisle, Saskatchewan. 10-24-1

Registered or Graduate General Duty Nurses for 25-bed hospital. Salary as per SRNA policy: $300, room and board: $1.15 per day. 5 day, 40-hr. wk. No split shifts. Evening and night shift with extra pay if out of ordinary rotation. 9 statutory holidays, 3 wk. vacation. Free laundry, modern nurses' residence near hospital with TV — 2 channels. Phone: 2-2668 days, 2-2551 evenings or write: Mrs. Janie Sutherland, Superintendent of Nurses, Union Hospital, Eston, Saskatchewan. 10-33-1

General Duty Graduate Nurses for 12-bed hospital in south western Saskatchewan, basic salary $300 with yearly increments, 40-hr. wk. For further particulars write: Secretary, Municipal Hospital, Frontier, Saskatchewan. 10-37-1

U.S.A.

Registered Nurse, General Duty, 12 beds, 2 doctors, small town in southeastern Alaska. Write via airmail to: Superintendent, Bishop Rowe Hospital, Wrangell, Alaska. 15-2-1

Registered Nurses for modern 374-bed JCAH fully accredited General Hospital. Located on beautiful San Francisco Peninsula, 20-min. drive from the heart of the city. Openings in all services. Excellent personnel policies. Many extra benefits & opportunities for advancement. Top salaries. Apply: Personnel Director, Peninsula Hospital, 1783 El Camino Real, Burlingame, California. 15-5-20

Registered Nurses. Career satisfaction, interest and professional growth unlimited in modern, JCAH accredited 254-bed hospital. Located in one of California's finest areas, recreational, educational and cultural advantages are yours as well as wonderful year-round climate. If this combintion is what you're looking for, contact us now! Staff Nurse entrance salary $370 with automatic increases to $435 per mo., supervisory positions at increased rate. Special area and liberal shift differentials paid. Excellent benefits including Blue Cross hospitalization and surgical coverage and liberal personnel policies. Professional staff appointments available in all clinical areas to those eligible for California licensure. Write today: Director of Nursing, Eden Hospital, 20103 Lake Chabot Road, Castro Valley, California. 15-5-12

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Until registration in Ontario is established — $295.

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Annual sick time 12 days after one year, cumulative to 18 days. Hospitals of Ontario Pension Plan.

Ontario Hospital Insurance and Physicians' Services Incorporated, 50% payment by hospital.

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Registered Nurses, Staff Nurses for permanent positions, various departments, days, eves., nights. Excellent starting salary, increments, benefits and working conditions in one of the largest and finest general hospitals in the West. For details write: Personnel Department, Queen of Angels Hospital, 2301 Bellevue Avenue, Los Angeles 26, California. 15-5-3G

Registered Nurses for private 258-bed hospital for men, women and children. Staff Nurse salaries from $355-$435, differentials for evenings, nights, communicable disease, operating room and delivery. Opportunities in all clinical areas. Holidays, vacations, sick leaves and health insurance. California registration required. Applications and details furnished on request. Contact: Personnel Director, Children's Hospital, 3700 California Street, San Francisco 18, California. 15-5-4

Registered Nurses General Duty for 230-bed approved teaching hospital, resort city. Starting salary $375 per mo. plus $22.50 shift differential, provision for housing allowance. Apply: Director of Nursing, Cottage Hospital, Santa Barbara, California. 15-5-39

Staff Duty positions (Nurses) in private 428-bed hospital. Liberal personnel policies and salary. Differential for evening and night duty. Write: Personnel Director, Hospital of The Good Samaritan, 1212 Shatto Street, Los Angeles 17, California. 15-5-3B

Staff Nurses for new modern 800-bed General and Tuberculosis Institution in beautiful San Joaquin Valley city — no smog — no snow — 235,000 in metro. area, midway between Los Angeles and San Francisco, close to 3 National Parks, 2 colleges and other cultural advantages. Full maintenance available. Immediate appointment $4,320 to $5,400 per year. Apply immediately to: Director of Personnel, Fresno County Civil Service, Room 101, Hall of Records Building, Fresno 21, California. 15-5-17A

Staff Nurses for 300-bed General Hospital. Attractive personnel policies plus differential for specialties, afternoon and night duty. Opportunities for advanced education. Apply to: Director of Nursing Service, Kaiser Foundation Hospital, Oakland 11, California. 15-5-3C

Nurses for new 75-bed General Hospital. Resort area. Ideal climate. On beautiful Pacific ocean. Apply to: Director of Nurses, South Coast Community Hospital, South Laguna, California. 15-5-50

General Duty Nurses for various departments including surgery for 72-bed hospital. Starting salary $375 per mo. with periodic increases & fringe benefits. College town, tourist area, ideal climate. Contact: Superintendent, Alamosa Community Hospital, Alamosa, Colorado. 15-6-1

Registered Nurses, Licenced Practical Nurses for 250-bed hospital. Excellent benefits including retirement plan. Ocean bathing & housing accommodation available. Apply: Director of Nursing Service, St. Francis Hospital, Allison Island, Miami Beach, Florida. 15-10-2

General Duty Nurses for 54-bed hospital, minimum starting salary $350 per mo., located near Miami and West Palm Beach. Apply: Director of Nurses, Belle Glade Memorial Hospital, Belle Glade, Florida. 15-10-3

General Staff Nurses (Various assignments) in 356-bed J.C.A.H. accredited hospital, differential for P.M.'s & Nights, paid vacation, legal holidays, cumulative sick leave, retirement plan, Blue Cross Hospitalization paid by hospital, tuition aid. Conveniently located near Lincoln Park, near Loop and educational centers. Fusnished apartments available. Apply: Augustana Hospital, 411 W. Dickens Ave., Chicago 14, Illinois. 15-14-1

Staff Nurses (All Areas) Orientation and staff development programs, "nurse-saving" equipment, challenging working environment, individualized living accommodations in new air-conditioned cottages. Opportunity to participate in nursing practice of the finest quality in our 200-bed General Hospital, located along Lake Michigan shoreline, 30 mi. from Chicago. Starting salaries $390-$410 plus $30 differential for 3-11 and 11-7. Write: Director of Nursing, Highland Park Hospital, Highland Park, Illinois, for detailed brochure. 15-14-3

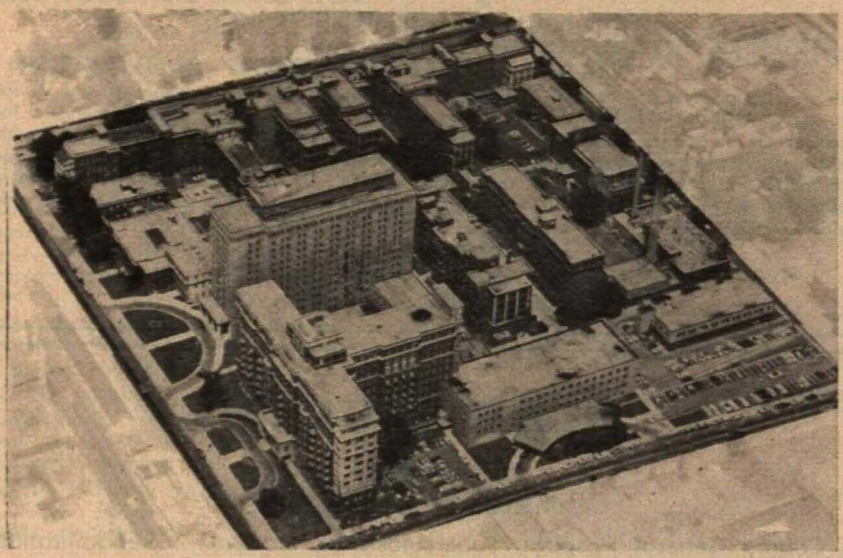
Staff Nurses & Licensed Practical Nurses (Openings in several areas, all shifts). Minimum starting pay $77 R.N.'s.; L.P.N.'s $61 per wk., experience considered, differentials paid for reliefs, nights. Every other weekend off in small community hospital 2 miles from Boston. Living quarters available. Contact: Miss Elizabeth Hewitt, R.N., Director of Nurses, Chelsea Memorial Hospital, Chelsea, Mass. 15-22-1

Registered Nurses: Salary $325-$340 per mo., with periodic increases, excellent personnel policies. Further information contact: Administration, Red King City Hospital, Red Wing, Minnesota. 15-24-4

COURSES FOR R.N.'S N.Y. POLYCLINIC MED. SCH. & HOSP. — in heart of Manhattan — 6-mo. courses in: O.R. NURSING, OPD. NURSING, MED.-SURG. NURSING. Classes 4 times yrly: Mar., June, Sept., Dec. Room, meals, Medical Care & monthly cash stipend. Positions available to graduates of our Courses. For information write: Director of Nursing Education, 345 W. 50 St., N.Y.C., NEW YORK. 15-33-2A

Graduate Nurses for 450-bed non-sectarian acute General Hospital with NLN fully accredited school of nursing. Liberal personnel policies include tuition aid for study at Western Reserve University. Opening of new main building has created attractive positions for Staff Nurses in medical, surgical, obstetric & pediatric divisions. Apartments available in immediate neighborhood. Apply: Miss Louise Harrison, Director of Nursing Service, Mount Sinai Hospital, 1800 East 105th Street, Cleveland 6, Ohio. 15-36-1D

TORONTO GENERAL HOSPITAL



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Opportunity to gain additional knowledge in specialized fields of nursing
Excellent personnel policies
Salaries commensurate with prevailing current salaries in Metropolitan Toronto

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in modern 20-bed hospital located in thriving Northwestern Ontario community. Starting salary $275 minimum to $325 maximum for three years' experience. Board and room in modern nurses' residence is supplied at no charge. Excellent employee benefits and recreational facilities available. Further particulars on request.

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Salary is commensurate with experience.

Benefits include Pension Plan, Group Life Insurance, sick leave — 12 days after one year, Ontario Hospital Insurance — 50% payment by hospital.

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Kenora General Hospital

Kenora, Ontario

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$5,160 — $5,880

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The Medical Services Directorate provides interesting and satisfying career opportunities for Public Health Nurses.

Qualifications required include — current registration in any province of Canada, a Certificate in Public Health and preferably a Certificate in supervision and teaching or nursing service administration, and at least five years of acceptable experience.

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Ask for Circular 62-512

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GENERAL STAFF NURSES

required for

INTENSIVE CARE UNIT, SURGERY, MEDICINE, EMERGENCY DEPARTMENT AND OPERATING ROOMS.

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Hamilton General Hospital

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Hamilton, Ontario

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WOODSTOCK, ONTARIO

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MEDICAL CLINICAL TEACHER

Preferably with B.Sc.N. degree and experience.
Salary commensurate with qualifications and experience.

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Staff Nurses 380-bed hosp. new 120 med-surg. unit. Trans. pd. 1st class air to Albuq. and return within U.S. in exchange for 1-yr. emp. contract. Come to New Mexico "Land of Enchantment." Career opportunities, largest pvt. JCAH accredited hosp. in state; near U. of New Mexico, R.N. & B.S. pgm. Practical Nurse pgm. accredited state & NAPNE. Vacancies, Med-Surg. & occasionally O.B., Peds., & O.R., salaries $315 per mo. even., night or O.R. with call; 6-mo. increases up to $375; days $300 per mo. with increases up to $360. Rotation from day duty is required only when no person desiring permanent P.M. of night tour is available. Liberal personnel policies include: optional Blue Cross, Discount Hosp. Services, pd. sick leave cumulative to 5 wks., annual physical exam., vacation 1 yr. — 2 wks., 2 yrs. — 3 wks., 5 yrs. — 4 wks. Active in-service pgm. Occasional vacancy hosp. owned apts. New Mexico licensure as professional nurse & U.S. Citizenship (or Immigration Visa) required. Write or call collect: Mrs. Emily J. Tuttle, Dir. of Nursing, Presbyterian Hospital Center, 1012 Gold, S.E., Albuquerque, New Mexico. Phone 243-5611. 15-32-3

Staff Nurses for modern 400-bed tuberculosis hospital, suburban Cleveland, Ohio. Monthly salaries start at $396 with semi-annual increments. Extra for night and relief duty, 5-day work wk., 3-wk. paid vacation, 6 paid holidays, liberal sick leave, comfortable accommodations in nurses' residence at low rate. Learn and earn at a progressive accredited hospital in a growing community. Write: Director of Nursing, Sunny Acres Hospital, Cleveland 22, Ohio. 15-36-1E

Registered Nurse (Scenic Oregon, vacation playground, skiing, swimming, boating & cultural events) for 295-bed teaching unit on campus of University of Oregon medical school. Salary starts at $372. Pay differential for nights & evenings. Liberal policy for advancement, vacations, sick leave, holidays. Apply: Multnomah Hospital, Portland 1, Oregon. 15-38-1

Staff Nurses (All Clinical Services) Base salary $350, opportunities for advancement, differential for 3-11 & 11-7 shifts, personnel policies, sick leave, retirement plan, 3-wk. vacation & laundry of uniforms. Orientation & in-service programs, housing available on campus. Apply: Director of Nursing Service, University of Texas Medical Branch Hospitals, Galveston, Texas. 15-44-5

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ALBERTA

Registered Nurses & Certified Nursing Aides (immediately) for new 70-bed hospital. Salary $325 - $370; $200 - $240; 40-hr. wk., liberal personnel policies, experience considered. Apply: Sister Superior, Providence Hospital, **HIGH PRAIRIE**, Alberta. 1-45-1

General Duty Registered Nurses for accredited 55-bed General Hospital. Salary range $300 - $345 per mo., 3 semi-annual increments of $15 each. Past service recognized in establishing starting salary. Residence accommodation available, up-to-date personnel policies including 3-wk. vacation, 10 statutory holidays, sick leave accumulative to 90 days, pension program, 40-hr. wk., medical & hospitalization coverage. **Apply** giving age, marital status, experience & training or for further information write to: Director of Nursing, Municipal Hospital, Hanna, Alberta. 1-43-1

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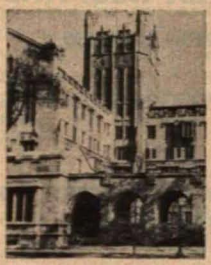

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Certificate in Nursing Education required. Additional Salary for Degree. One Class per year registers in September. Well-equipped modern school and residence.

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General Duty Nurses for Obstetrics and Operating Room in new 188-bed Regional Hospital on Vancouver Island opening in January, 1963.

Salary: General Duty R.N. $320 to $387.

Allowance for experience and postgraduate education.

Personnel policies in accordance with RNABC includes Statutory Holidays, 20 days Vacation, Sick Leave, Medical Plan and Pension Fund.

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New positions are being created for Supervisors — Day, evening and night at 60-bed General Hospital.

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General Staff Nurse positions available in General Operating Rooms (general surgical, cardiac, neuro-surgical, plastic, orthopedic, ear, nose and throat, and urology). Positions also in Gynecological and Ophthalmological operating rooms. Salary commensurate with experience, excellent additional benefits including refund of tuition up to six points per semester.

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requires

Registered Nurses for all services

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Certified Nursing Assistants

40 hour week - Pension plan - Good salaries and Personnel Policies.

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Clinical Instructor for Obstetrical Department

Salary: $355-$435 per month commensurate with qualifications. Alberta registration. Credit for past experience.

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Salary: $290-$345 per month. Alberta registration. Credit for past experience and postgraduate work. Experience available in all Departments.

[Excellent personnel policies including group hospital services, pension plan, sick leave benefits, group insurance, vacation, etc.]

Staff now being considered for opening of new 600-bed active treatment hospital early in 1963.

Furnish details as to training, qualifications, experience, etc. to:

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EXECUTIVE DIRECTOR NURSING
ROYAL ALEXANDRA HOSPITAL
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UNIVERSITY OF ALBERTA HOSPITAL

EDMONTON, ALBERTA

requires

REGISTERED NURSES

for general duty to fill fall vacancies.

Salary schedule: $290-$345 per month.

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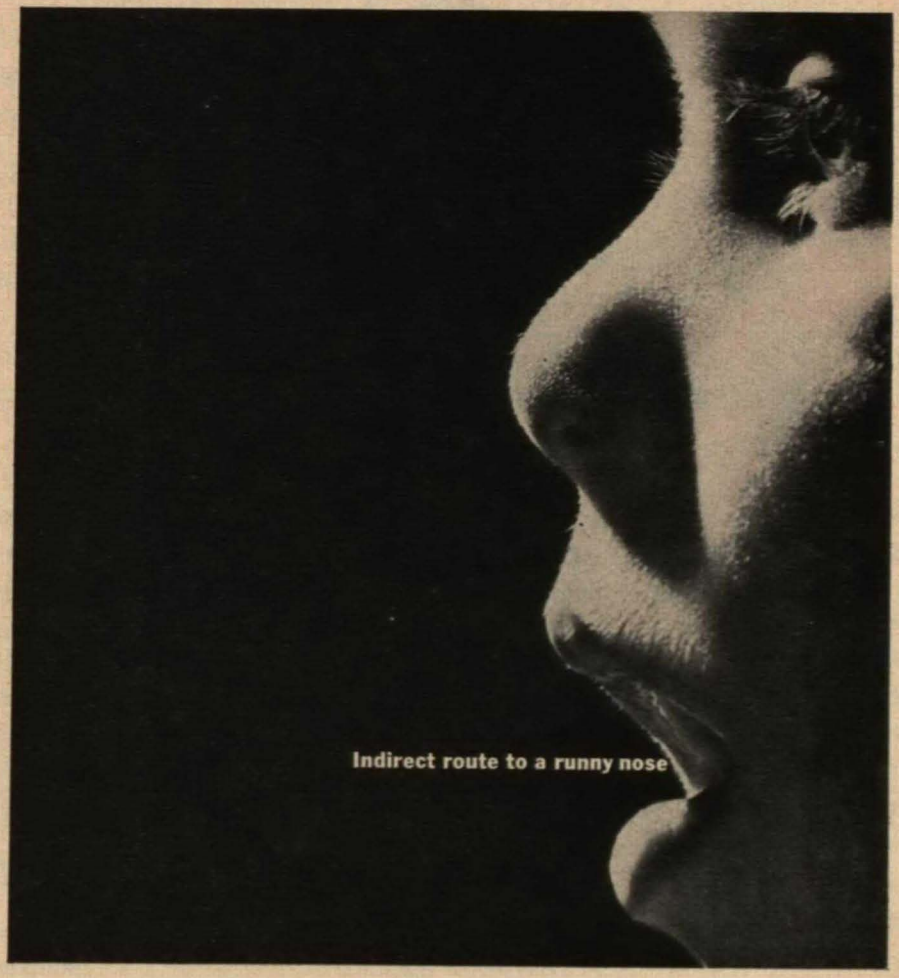

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